FCC TEST REPORT

For

Team Free

Model Number: TF100

FCC ID: 2A82ETF100

Report Number : WT228002409

Test Laboratory	:	Shenzhen Academy of Metrology and Quality Inspection
Site Location	:	NETC Building, No.4 Tongfa Rd., Xili, Nanshan, Shenzhen, China
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Revision History

No	Date	Remark
V1.0	2023.02.06	Initial issue

TEST REPORT DECLARATION

Applicant	:	Shenzhen Jiancheng Yunshi Technology Co., Ltd
Address	:	A2101, Building 9, Zone 2, No. 3609 Baishi Road, Nanshan District, Shenzhen
Manufacturer	:	Shenzhen Jiancheng Yunshi Technology Co., Ltd
Address	:	A2101, Building 9, Zone 2, No. 3609 Baishi Road, Nanshan District, Shenzhen
EUT Description	:	Team Free
Model No.	:	TF100
Trade mark	:	TELE System
Serial Number	:	/
FCC ID	:	2A82ETF100

Test Standards:

FCC Part 15 Subpart E 15.407

The EUT described above is tested by Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory to determine the maximum emissions from the EUT. Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory is assumed full responsibility for the accuracy of the test results. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2020) and the energy emitted by the sample EUT tested as described in this report is in compliance with FCC Rules Part 15.207, 15.209 and 15.407.

The test report is valid for above tested sample only and shall not be reproduced in part without written approval of the laboratory.

Project Engineer:	陈司林	Date:	Feb.06, 2023
	(Chen Silin 陈司林)		
Checked by:	石昌达	Date:	Feb.06, 2023
	(Shi Changda 施昌达)		
Approved by:	林奕翔	Date:	Feb.06, 2023
	(Lin Yixiang 林奕翔)		

TABLE OF CONTENTS

1. TEST RESULTS SUMMARY

Table 1 Test Results Summary

Test Items	FCC Rules	Test Results
6dB Bandwidth	FCC §15.407 (e)	Pass
26dB Bandwidth	FCC §15.407 (a)	Pass
Maximum Peak Conducted Power	FCC §15.407 (a)	Pass
Maximum Power Spectral Density Level	FCC §15.407 (a)	Pass
Radiated Bandedge and Spurious	15.407 (b) 15.209 15.205	Pass
Conducted emission test for AC power port	15.207	Pass
Antenna Requirement	15.203	Pass

Remark: “N/A” means “Not applicable.”

2. GENERAL INFORMATION

2.1. Report Information

This report is not a certificate of quality; it only applies to the sample of the specific product/equipment given at the time of its testing. The results are not used to indicate or imply that they are application to the similar items. In addition, such results must not be used to indicate or imply that SMQ approves recommends or endorses the manufacture, supplier or use of such product/equipment, or that SMQ in any way guarantees the later performance of the product/equipment.

The sample/s mentioned in this report is/are supplied by Applicant, SMQ therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture or any information supplied.

Additional copies of the report are available to the Applicant at an additional fee. No third part can obtain a copy of this report through SMQ, unless the applicant has authorized SMQ in writing to do so.

The lab will not be liable for any loss or damage resulting for false, inaccurate, inappropriate or incomplete product information provided by the applicant/manufacturer.

2.2. Laboratory Accreditation and Relationship to Customer

The testing report were performed by the Shenzhen Academy of Metrology and quality Inspection EMC Laboratory (Guangdong EMC compliance testing center), in their facilities located at NETC Building, No.4 Tongfa Rd., Xili, Nanshan, Shenzhen, China. At the time of testing, Laboratory is accredited by the following organizations:

China National Accreditation Service for Conformity Assessment (CNAS) accredits the Laboratory for conformance to FCC standards, EMC international standards and EN standards. The Registration Number is CNAS L0579.

The Laboratory is Accredited Testing Laboratory of FCC with Designation number CN1165 and Site registration number 582918.

The Laboratory is registered to perform emission tests with Innovation, Science and Economic Development (ISED), and the registration number is 11177A.

The Laboratory is registered to perform emission tests with VCCI, and the registration number are C-20048, G20076, R-20077, R-20078 and T-20047.

The Laboratory is Accredited Testing Laboratory of American Association for Laboratory Accreditation (A2LA) and certificate number is 3292.01.

2.3. Measurement Uncertainty

Conducted Emission
9 kHz~150 kHz U=3.7dB k=2
150 kHz~30MHz U=3.3dB k=2

Radiated Emission
30MHz~1000MHz U=4.3dB k=2
1GHz~6GHz U=4.6 dB k=2
6GHz~40GHz U=5.1dB k=2

3. PRODUCT DESCRIPTION

NOTE: The extreme test conditions for temperature and antenna gain were declared by the manufacturer.

3.1. EUT Description

Description	:	Team Free
Manufacturer	:	Shenzhen Jiancheng Yunshi Technology Co., Ltd
Model Number	:	TF100
Operate Frequency	:	U-NII 1(5180~5240 MHz) U-NII 3(5745~5825 MHz)
Antenna Designation	:	Loop Antenna 5180~5240 MHz: 1.47 dBi 5745~5825 MHz: 4.24 dBi
Operating voltage	:	AC 120V60Hz
Software Version	:	V1.1.34
Hardware Version	:	V11

Remark: /

Frequency List:

Band 1

Ch.	Frequency (MHz)
36	5180
40	5200
44	5220
48	5240

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Band 3

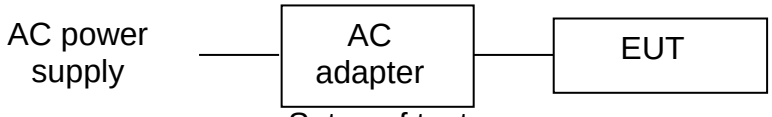
Ch.	Frequency (MHz)
149	5745
153	5765
157	5785
161	5805
165	5825

Table 2 802.11a/802.11n/802.11ac (20MHz) Frequency /Channel operations

3.2. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: 2A82ETF100 filing to comply with Section 15.207，15.209，15.407 of the FCC Part 15, Subpart E .

3.3. Block Diagram of EUT Configuration



Setup of test

3.4. Operating Condition of EUT

The Radiated spurious emission measurements were carried out in semi-anechoic chamber with 3-meter test range, and EUT is rotated on three test planes to find out the worst emission (X plane).
Worst-case mode and channel used for 30-1000 MHz radiated and power line conducted emissions was the mode and channel with the highest output power.
Worst-case data rates as provided by the client were:
802.11a mode: 6 Mbps
802.11n HT20 mode: MCS0
802.11ac VHT20 mode: MCS0
802.11a operates in SISO mode. For SISO conducted measurements, the modes tested in this report will be considered as a worst case mode.
802.11n operate in SISO mode. For SISO conducted measurements, the modes tested in this report will be considered as a worst case mode.
802.11ac operate in SISO mode. For SISO conducted measurements, the modes tested in this report will be considered as a worst case mode.
Antenna configuration

Main Antenna	Diversity Antenna
TX/RX	RX

3.5. Directional Antenna Gain

The EUT does NOT support a WIFI MIMO function.
Directional gain need NOT to be considered.

3.6. Support Equipment List

Table 3 Support Equipment List

Name	Model No	S/N	Manufacturer
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3.7. Test Conditions

Date of test: Oct.19, 2022- Feb.06, 2023
Date of EUT Receive: Oct.18, 2022
Temperature: 22℃-25℃
Relative Humidity: 46%-52%

3.8. Special Accessories

Not available for this EUT intended for grant.

3.9. Equipment Modifications

Not available for this EUT intended for grant.

4. TEST EQUIPMENT USED

Table 4 Test Equipment

No.	Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
SB9058/05	Test Receiver	R&S	ESCI 3	Sep.13,2022	1 Year
SB4357	AMN	R&S	ENN216	Aug.23,2022	1 Year
SB9548	Shielded Room	Albatross	SR	Sep.06,2022	1 Year
SB17366	Test Receiver	R&S	ESR26	Jun.22,2022	1 Year
SB3345	Loop Antenna	Schwarzbeck	FMZB1516-113	Jan.19,2023	1 Year
SB3955	Broadband Antenna	SCHWARZBECK	VULB9163	Jun.22,2022	1 Year
SB9555/01	Semi Anechoic Chamber	Albatross	9×6×6(m)	Aug.16,2022	1 Year
SB13961	Horn Antenna	R&S	HF907	Mar.22,2022	1 Year
SB8501/09	Test Receiver	R&S	ESU40	Jan.19,2023	1 Year
SB3435	Horn Antenna	R&S	HF906	Nov.28,2022	1 Year
SB9058/03	Pre-Amplifier	R&S	SCU 18	Jan.19,2023	1 Year
SB8501/10	Horn Antenna	R&S	3160-09	Mar.10,2020	3 Years
SB8501/11	Horn Antenna	R&S	3160-09	Mar.09,2020	3 Years
SB8501/12	Horn Antenna	R&S	3160-10	Mar.17,2020	3 Years
SB8501/13	Horn Antenna	R&S	3160-10	Mar.10,2020	3 Years
SB8501/14	Pre-Amplifier	R&S	SCU-03	Jan.19,2023	1 Year
SB8501/15	Pre-Amplifier	R&S	SCU-03	Jan.19,2023	1 Year
SB8501/16	Pre-Amplifier	R&S	SCU 26	Jan.19,2023	1 Year
SB8501/17	Pre-Amplifier	R&S	SCU-18	Jan.17,2023	1 Year
SB9059	Pre-Amplifier	R&S	SCU-40	Aug.23,2022	1 Year
SB9555/02	Fully Anechoic Chamber	Albatross	10.0×5.2×5.4(m)	Aug.16,2022	1 Year
SB20321/01	Spectrum Analyzer	R&S	FSV3044	Dec.15,2022	1 Year

Table 5 Test software

Name	Manufacturer	Version
Bluetooth and WiFi Test System	Shenzhen JS tonscend co.,ltd	2.6.87.0615

5. DUTY CYCLE

5.1. Limits of Duty Cycle

None; for reporting purposes only

5.2. Test Procedure

1. Set span = Zero
2. RBW = 20MHz
3. VBW = 30MHz,
4. Detector = Peak

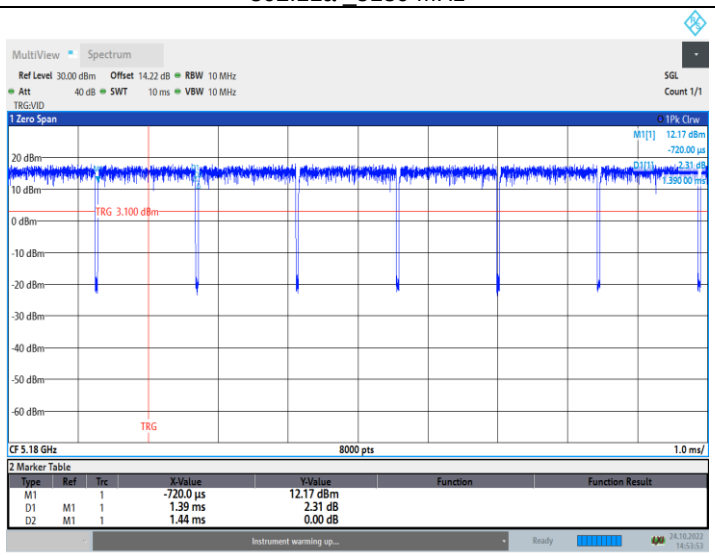
5.3. Test Setup

5.4. Test Data

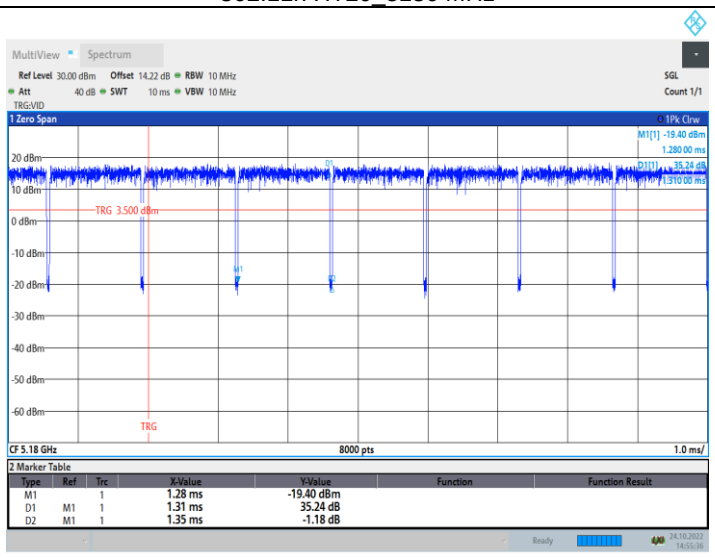
Table 6 Duty Cycle Test Data

Test Mode	On Time (ms)	Duty Cycle (%)	Duty Factor	1/T Minimum VBW (kHz)
802.11a	1.39	96.53	0.15	0.01
802.11n HT20	1.31	97.04	0.13	0.01
802.11ac VHT20	1.32	97.06	0.13	0.01

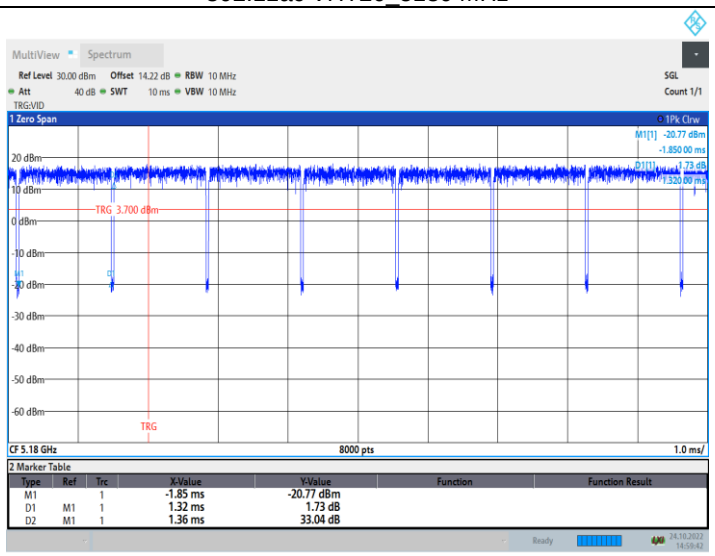
802.11a _5180 MHz



802.11n HT20_5180 MHz



802.11ac VHT20_5180 MHz



6. 6DB BANDWIDTH MEASUREMENT

6.1. Limits of 6dB Bandwidth Measurement

The minimum 6 dB emission bandwidth of at least 500 kHz for the band 5.725-5.85 GHz.

6.2. Test Procedure

The transmitter output was connected to the spectrum analyzer.
a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3 x RBW.
c)Detector = Peak.
d)Trace mode = max hold.
e)Sweep = auto couple.
f)Allow the trace to stabilize.
g)Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

6.3. Test Setup

6.4. Test Data

Table 7 6dB Bandwidth Test Data

Test Mode	Test Channel	6dB Bandwidth [MHz]	Limit [MHz]	Verdict
802.11a	5745	16.28	0.5	PASS
802.11a	5785	16.28	0.5	PASS
802.11a	5825	16.32	0.5	PASS
802.11n HT20	5745	17.52	0.5	PASS
802.11n HT20	5785	17.56	0.5	PASS
802.11n HT20	5825	17.56	0.5	PASS
802.11ac VHT20	5745	17.52	0.5	PASS
802.11ac VHT20	5785	17.56	0.5	PASS
802.11ac VHT20	5825	17.56	0.5	PASS

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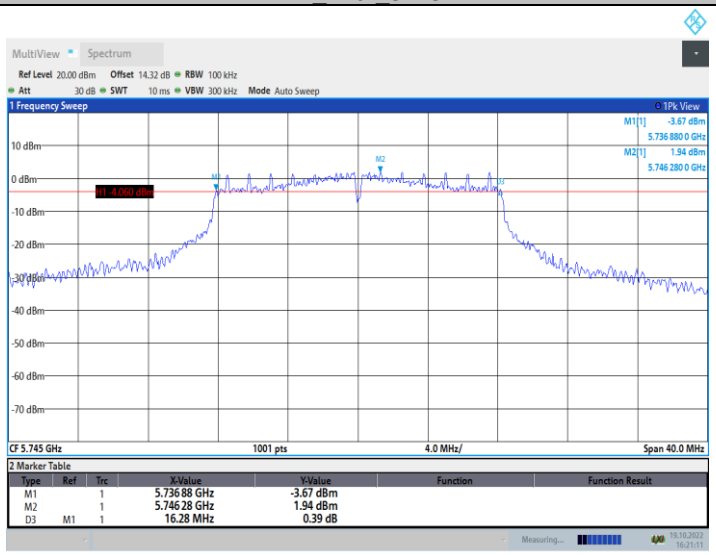 16:21:12 19.10.2022
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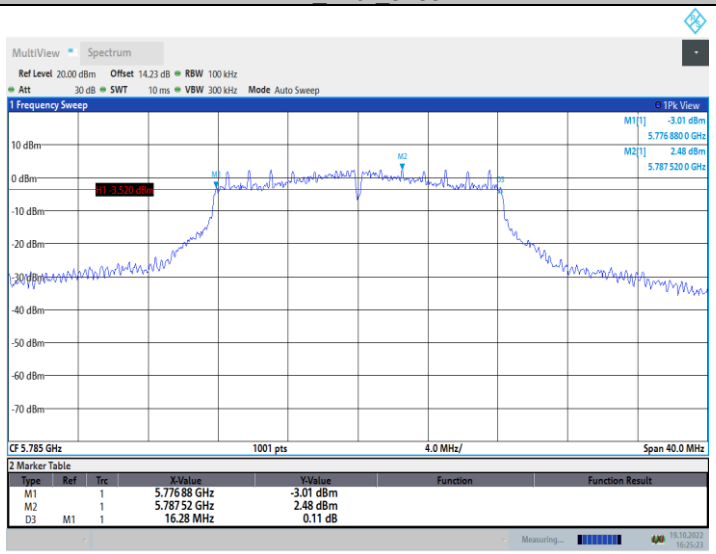 16:25:24 19.10.2022
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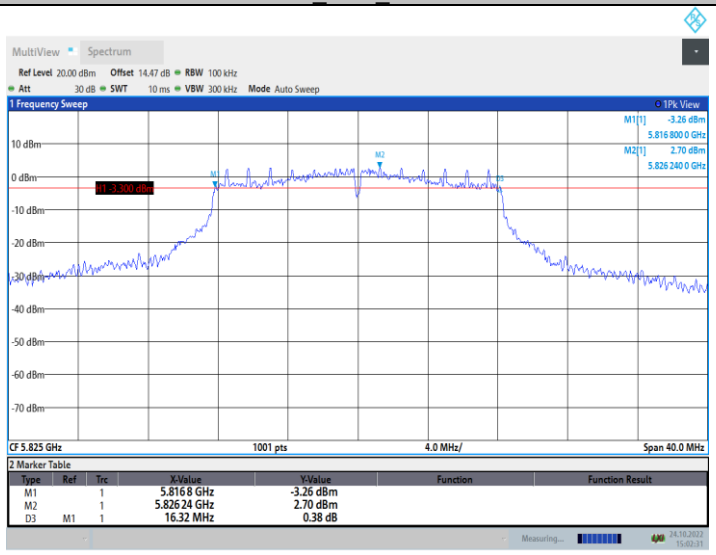 15:02:31 24.10.2022

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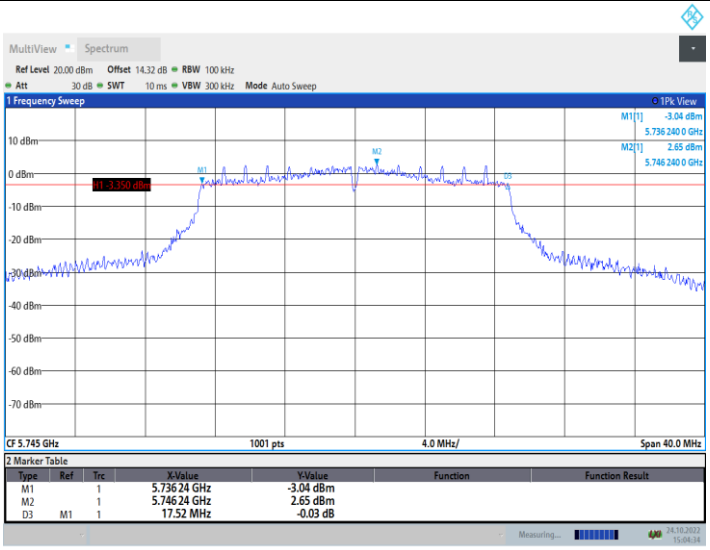
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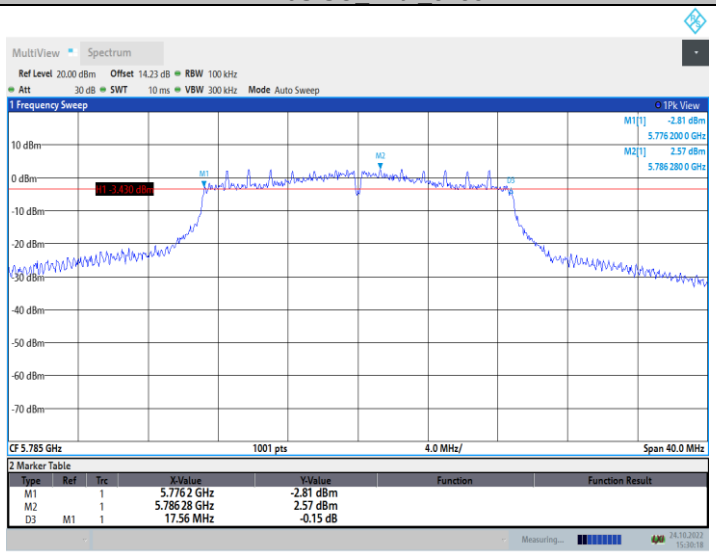
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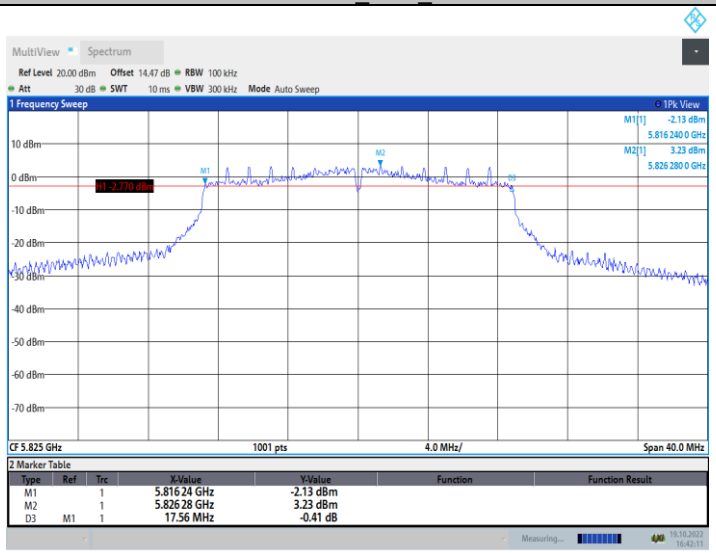

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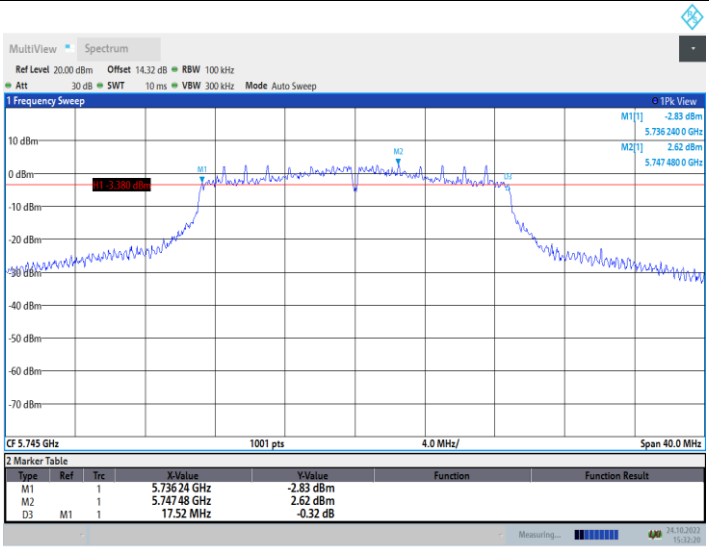 15:32:21 24.10.2022
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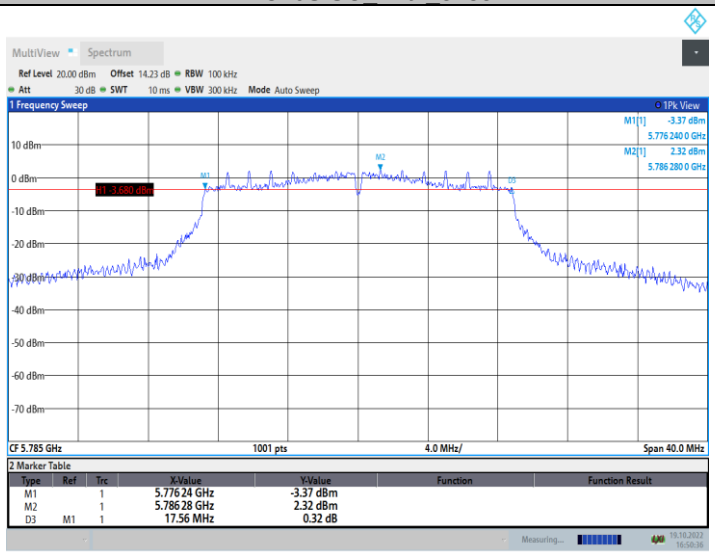 16:50:36 19.10.2022
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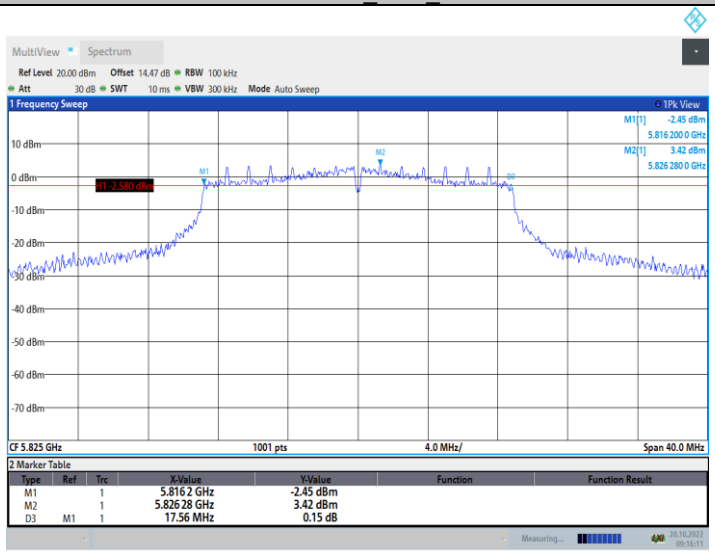 09:16:12 20.10.2022

7. 26DB BANDWIDTH MEASUREMENT

7.1. Limts of 26dB Bandwidth Measurement

None; for reporting purposes only.

7.2. Test Setup

a) Set RBW = approximately 1% of the emission bandwidth.
b) Set the VBW > RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

7.3. Test Setup

7.4. Test Data

Table 8 26dB Bandwidth Test Data

TestMode	Antenna	Channel	26db EBW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	Ant1	5180	34.68	5161.40	5196.08	---	---
		5200	21.16	5189.40	5210.56	---	---
		5240	21.20	5229.36	5250.56	---	---
		5745	21.96	5733.96	5755.92	---	---
		5785	21.40	5774.32	5795.72	---	---
		5825	21.36	5814.32	5835.68	---	---
11N20SISO	Ant1	5180	22.36	5168.68	5191.04	---	---
		5200	21.68	5189.24	5210.92	---	---
		5240	21.72	5229.28	5251.00	---	---
		5745	23.56	5734.12	5757.68	---	---
		5785	29.40	5769.28	5798.68	---	---
		5825	26.96	5810.32	5837.28	---	---
11AC20SISO	Ant1	5180	22.96	5168.48	5191.44	---	---
		5200	22.00	5189.24	5211.24	---	---
		5240	21.56	5229.12	5250.68	---	---
		5745	26.84	5731.76	5758.60	---	---
		5785	26.68	5771.88	5798.56	---	---
		5825	31.48	5807.72	5839.20	---	---

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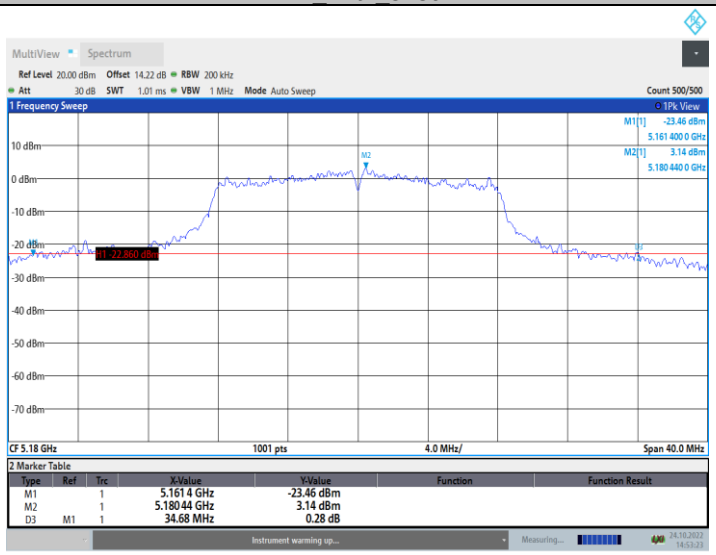

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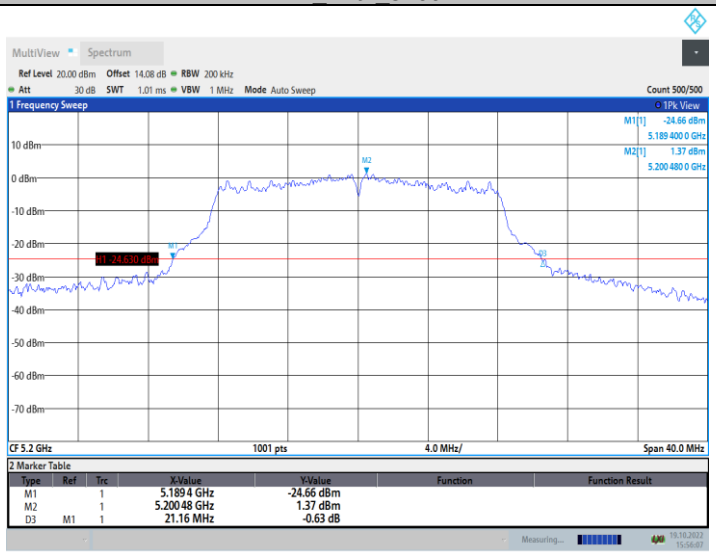

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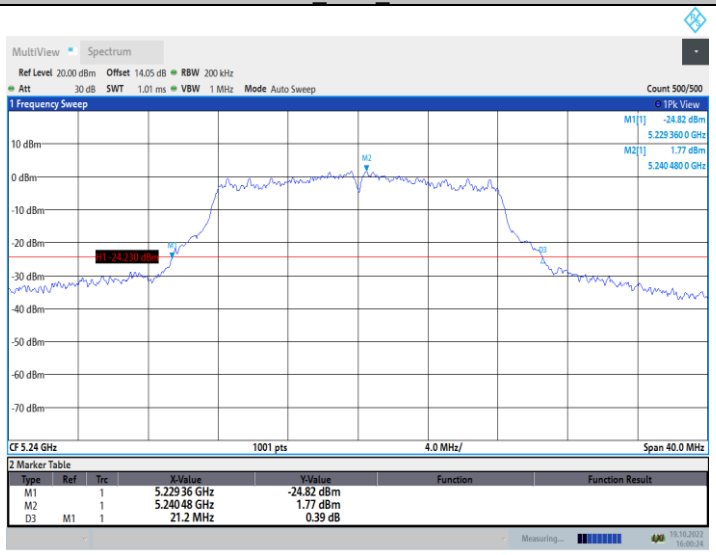

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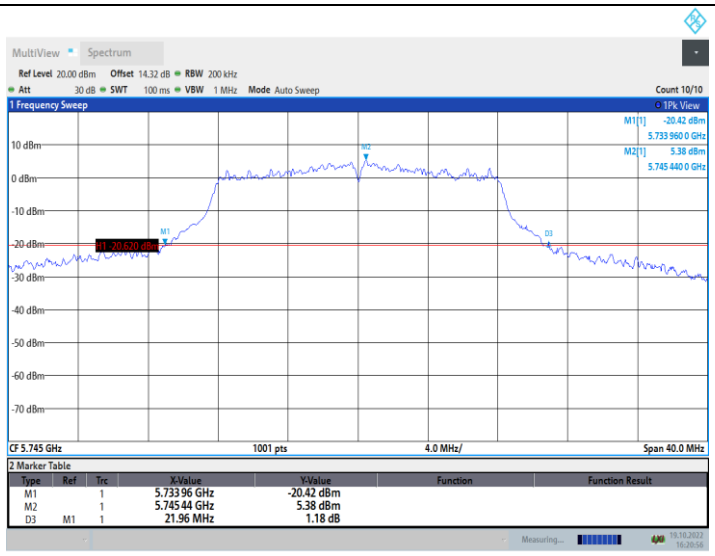

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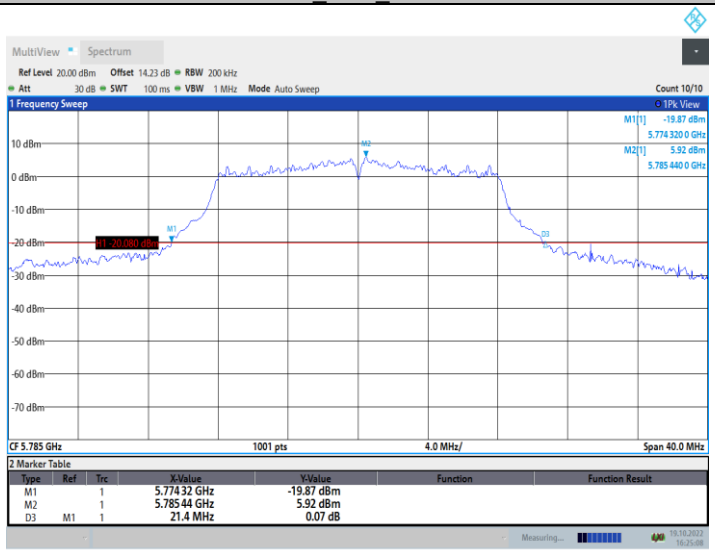

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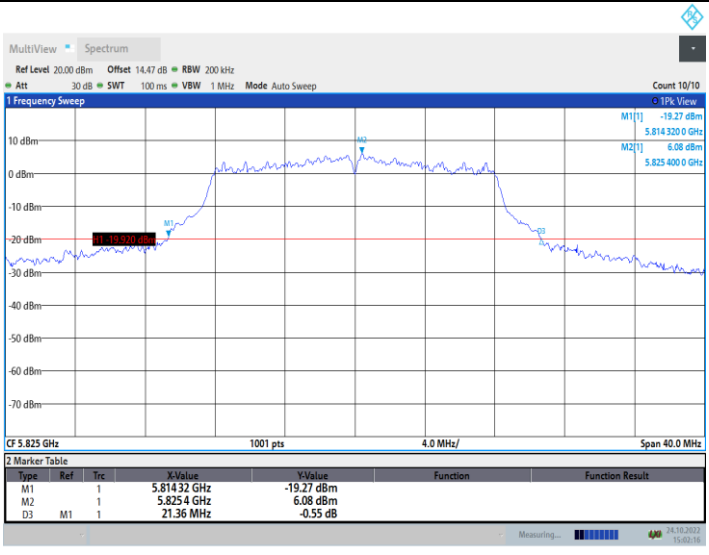

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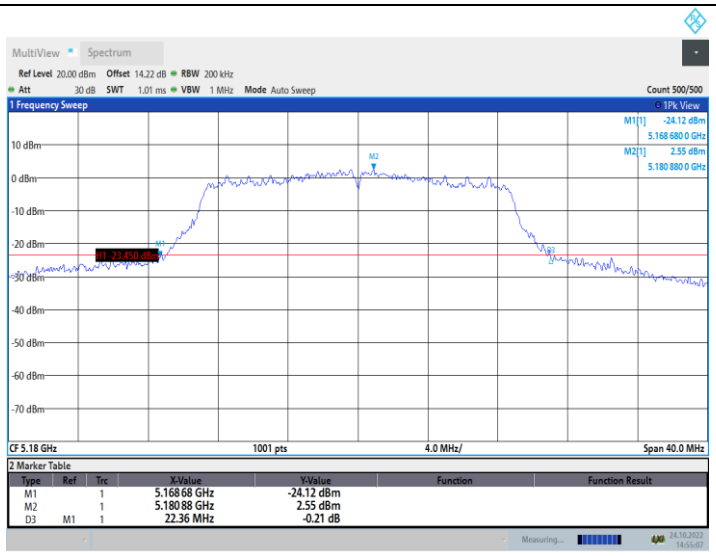

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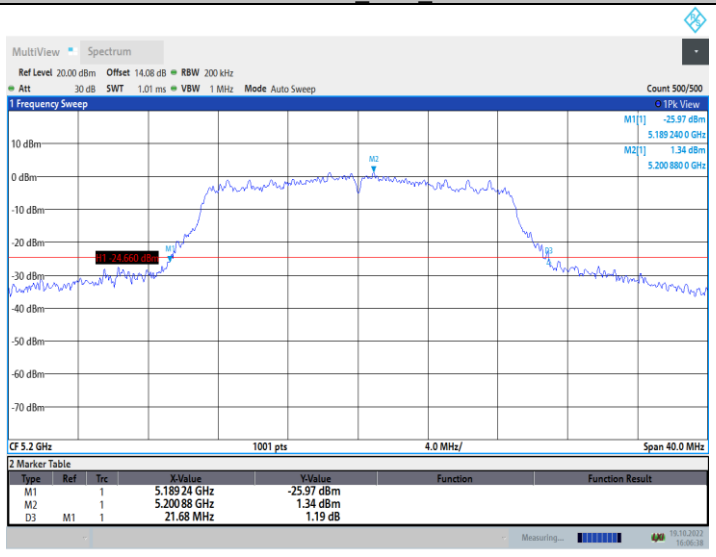

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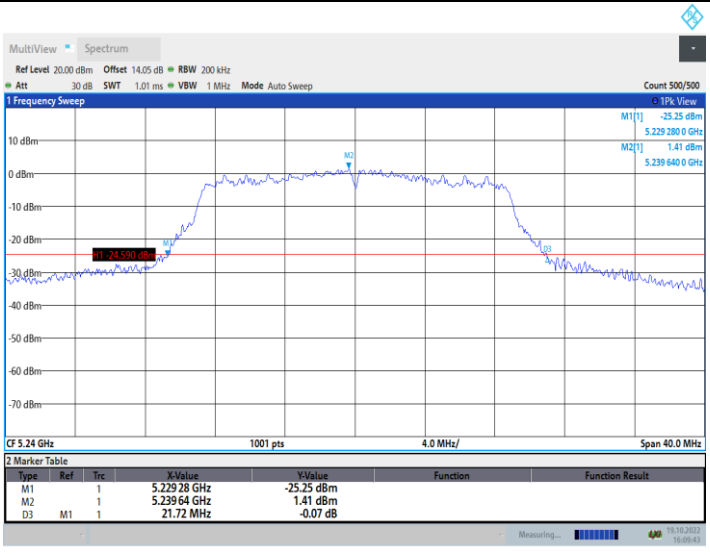

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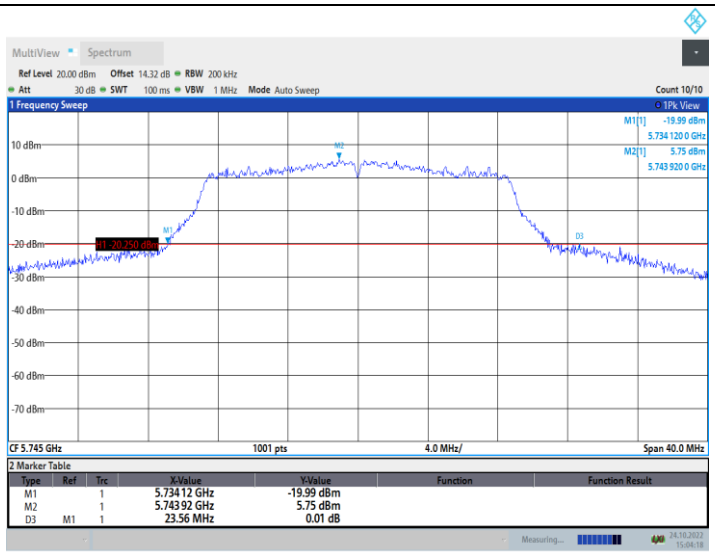

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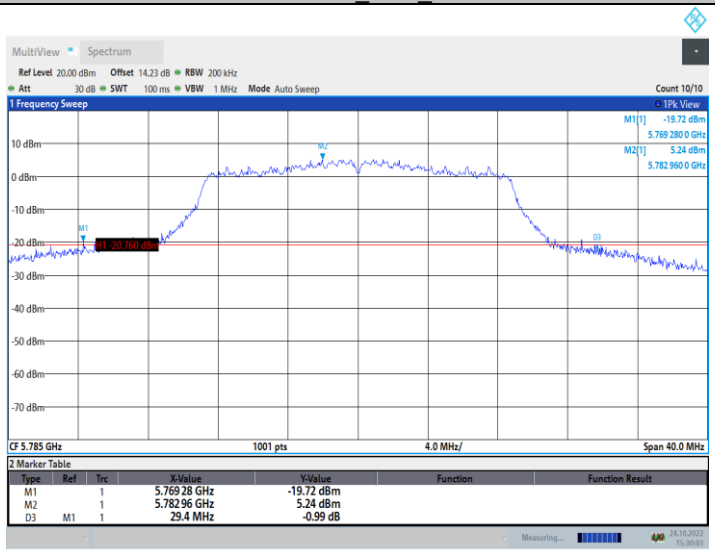

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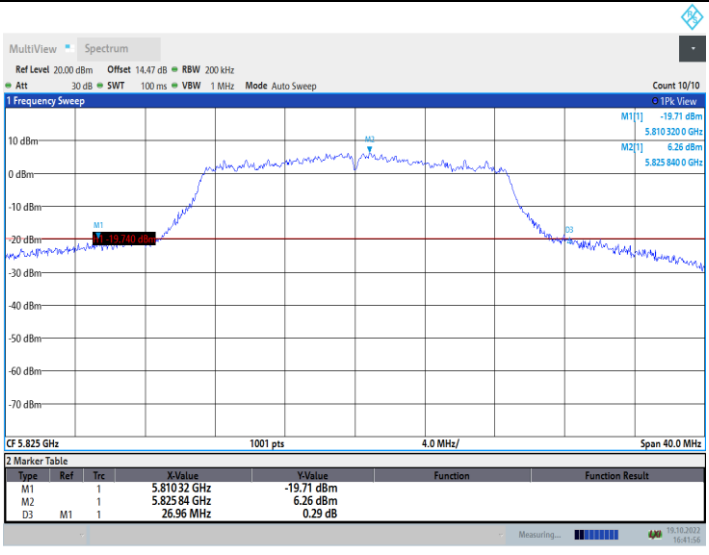

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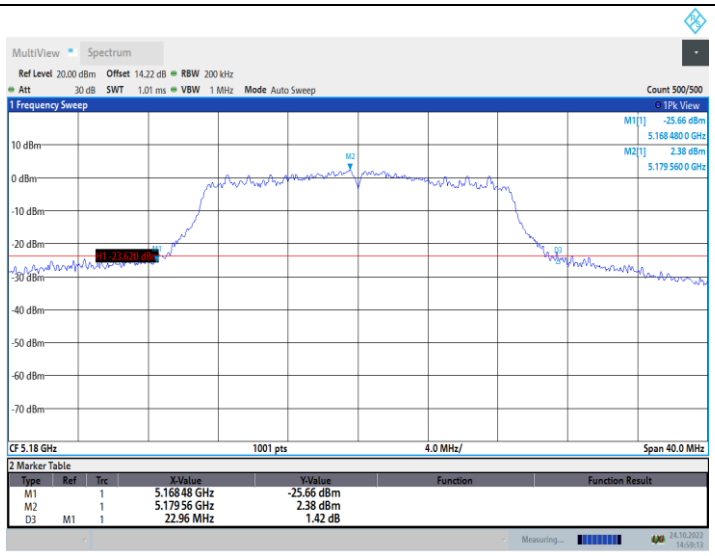

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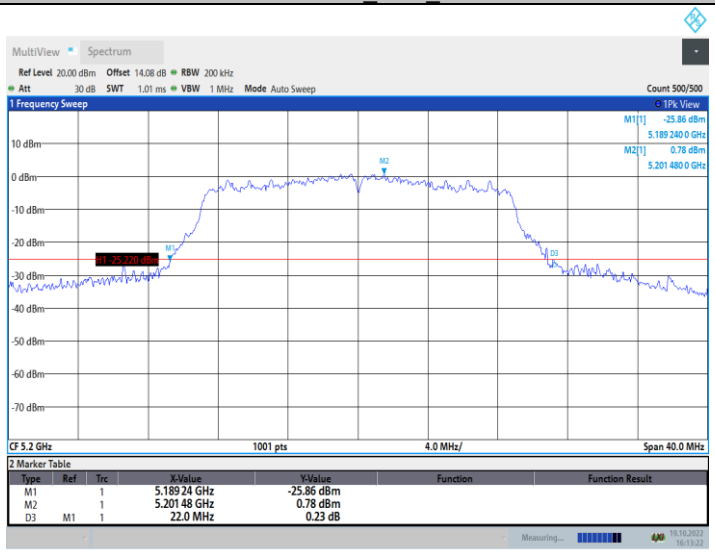

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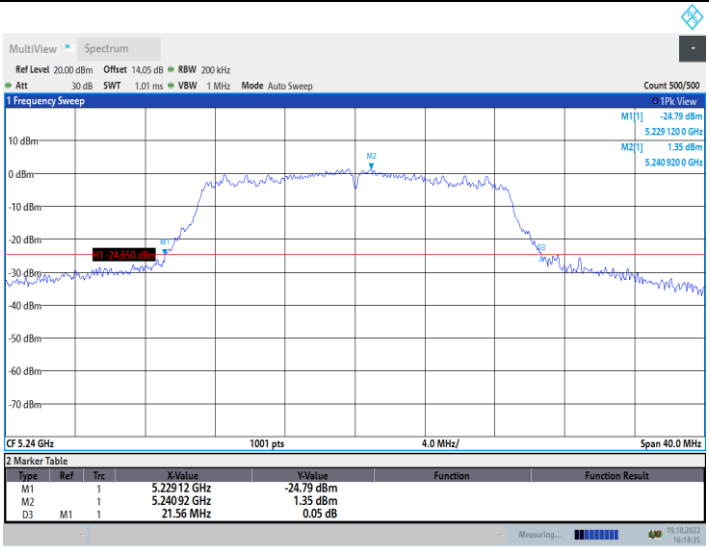

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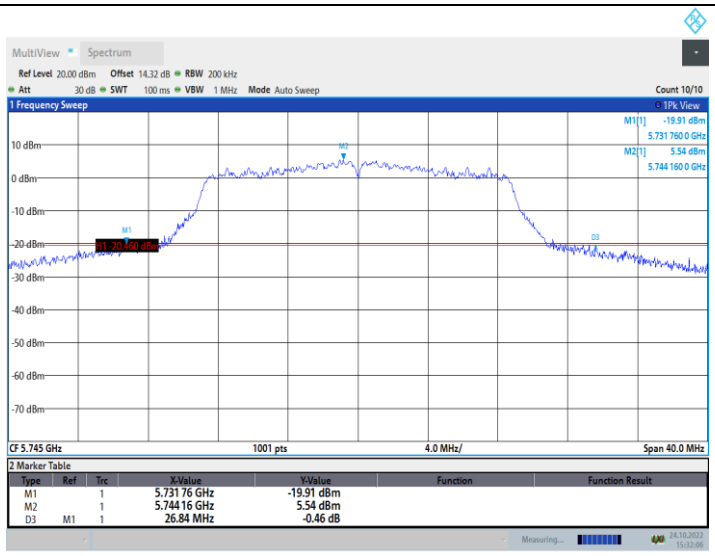

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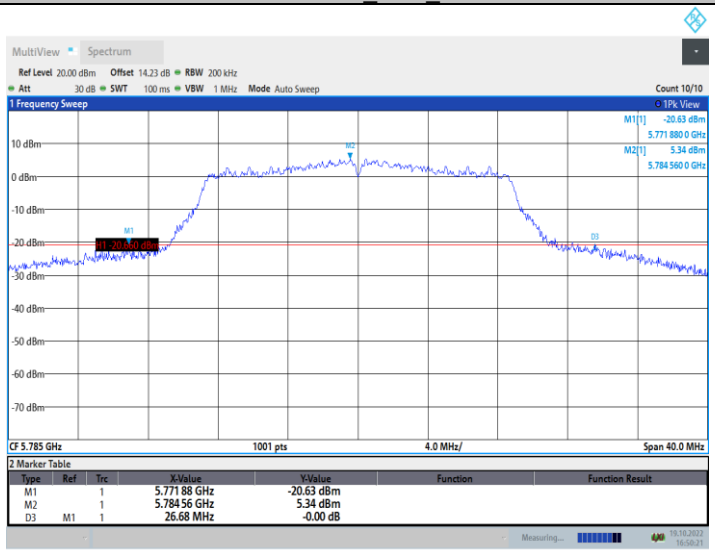

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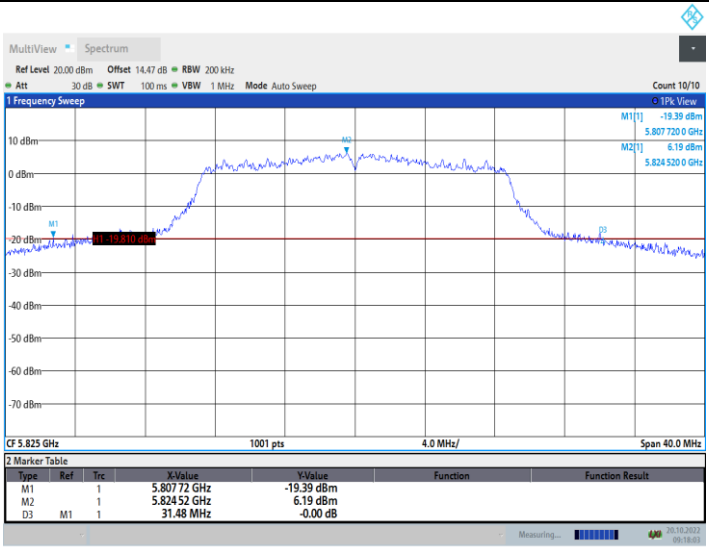

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8. MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

8.1. Limits of Maximum Conducted Output Power Measurement

CFR 47 (FCC) part 15.407 (a)
For the band 5.15–5.25 GHz.
For mobile and portable client devices in the 5.15–5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the max-imum antenna gain does not exceed 6 dBi.
For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz,the maximum antenna gain does not exceed 6 dBi.
For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

8.2. Test Procedure

(i) Measurements may be performed using spectrum analyzer if all of the conditions listed below are satisfied.
The EUT is configured to transmit continuously or to transmit with a constant duty cycle.
At all times when the EUT is transmitting, it must be transmitting at its maximum power control level.
The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.
(ii) If the transmitter does not transmit continuously, measure the duty cycle, x, of the transmitter output signal as described in section II.B.
(iii) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
(iv) Adjust the measurement in dBm by adding 10 log (1/x) where x is the duty cycle (e.g.,10 log (1/0.25) if the duty cycle is 25%) the measurement result.

8.3. Test Setup

8.4. Test Data

Table 9 Maximum Conducted Output Power Test Data

TestMode	Antenna	Channel	Result	Limit	Verdict
11A	Ant1	5180	11.73	≤23.98	PASS
		5200	10.04	≤23.98	PASS
		5240	10.61	≤23.98	PASS
		5745	13.82	≤30.00	PASS
		5785	14.38	≤30.00	PASS

		5825	14.50	≤30.00	PASS
11N20SISO	Ant1	5180	11.40	≤23.98	PASS
		5200	9.97	≤23.98	PASS
		5240	10.57	≤23.98	PASS
		5745	14.37	≤30.00	PASS
		5785	14.30	≤30.00	PASS
		5825	15.06	≤30.00	PASS
11AC20SISO	Ant1	5180	11.43	≤23.98	PASS
		5200	9.92	≤23.98	PASS
		5240	10.50	≤23.98	PASS
		5745	14.31	≤30.00	PASS
		5785	14.16	≤30.00	PASS
		5825	14.98	≤30.00	PASS

Note：The Duty Cycle Factor is compensated in the graph.

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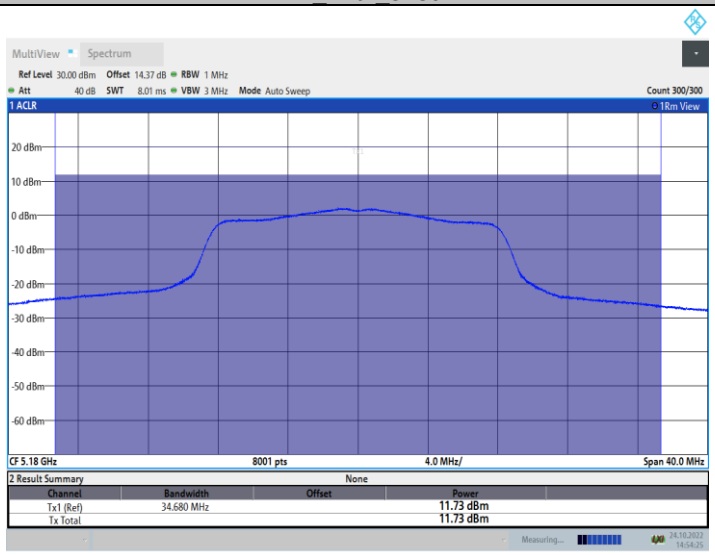
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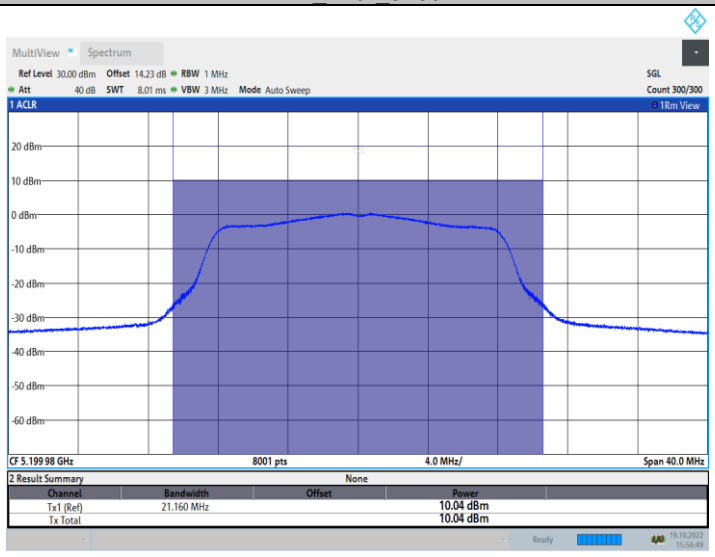
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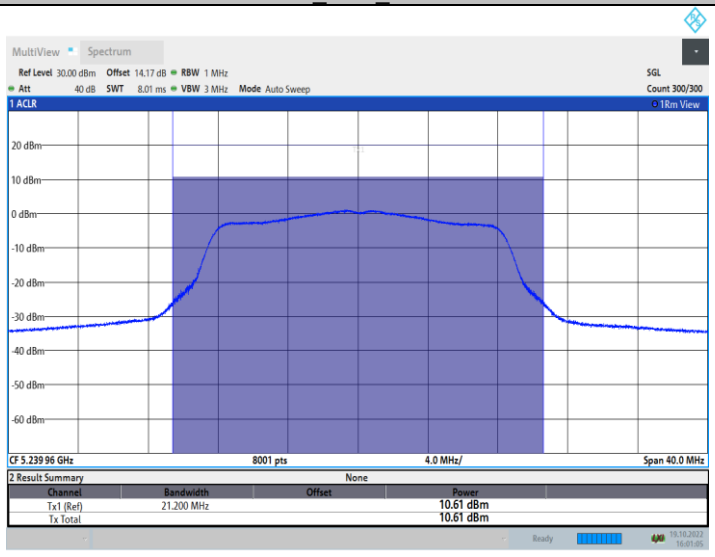
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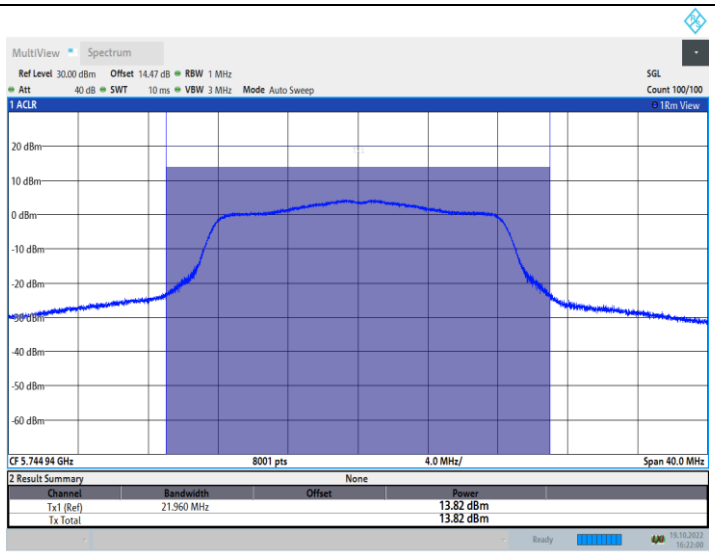

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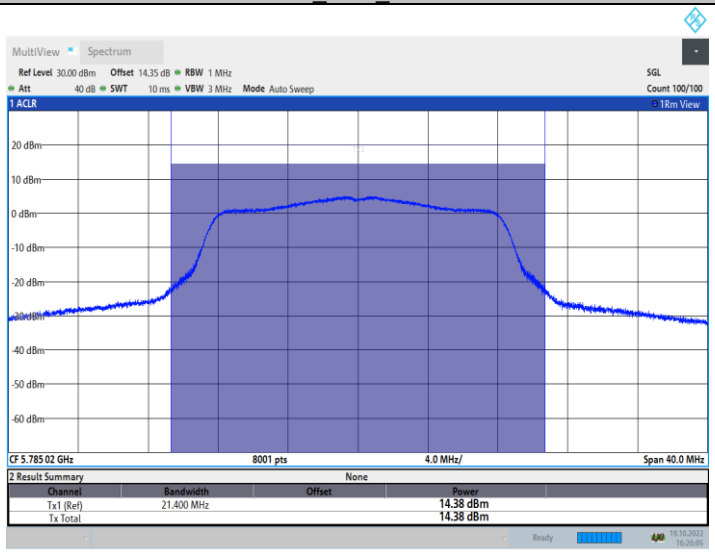

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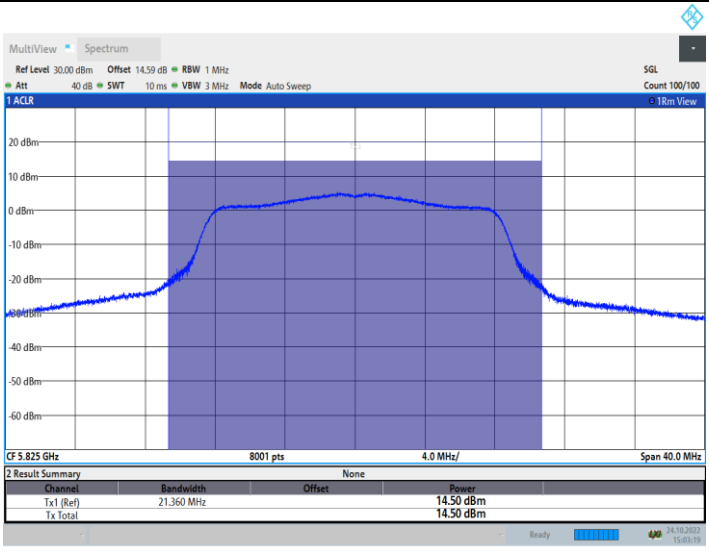

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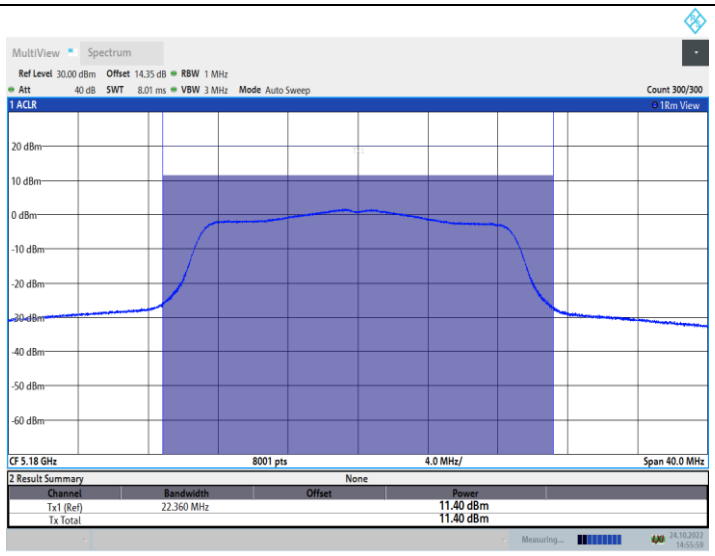

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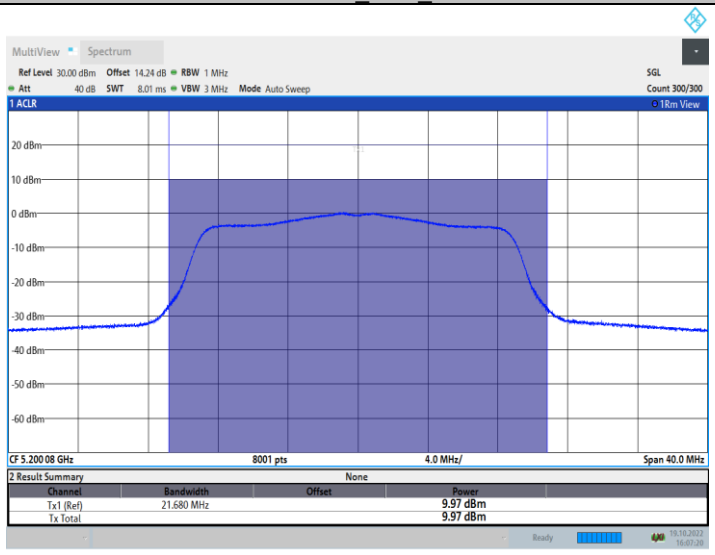

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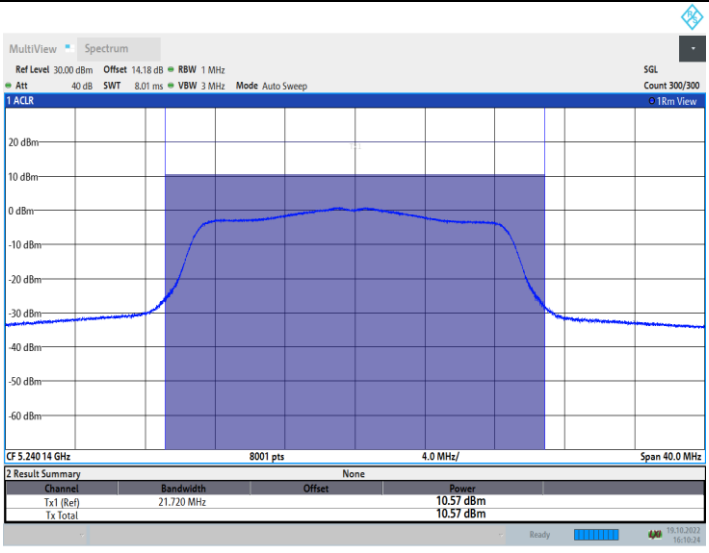

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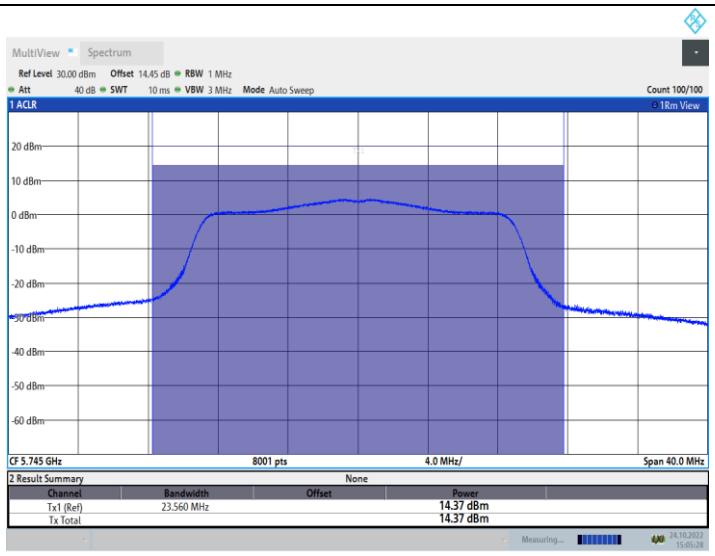

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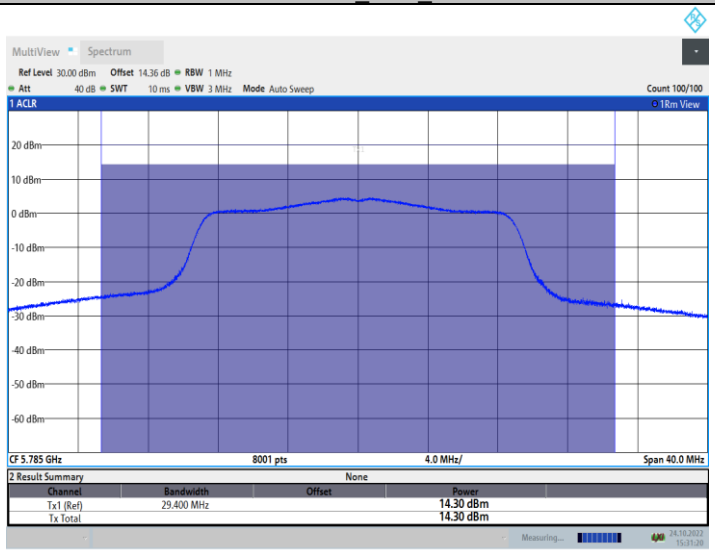

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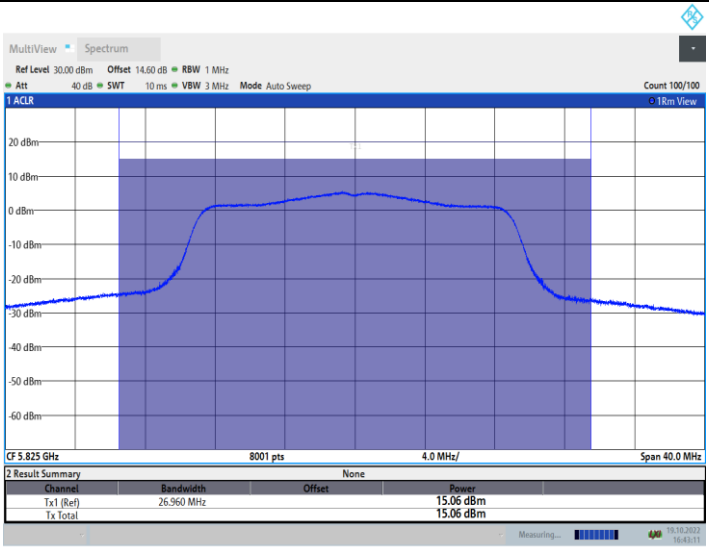

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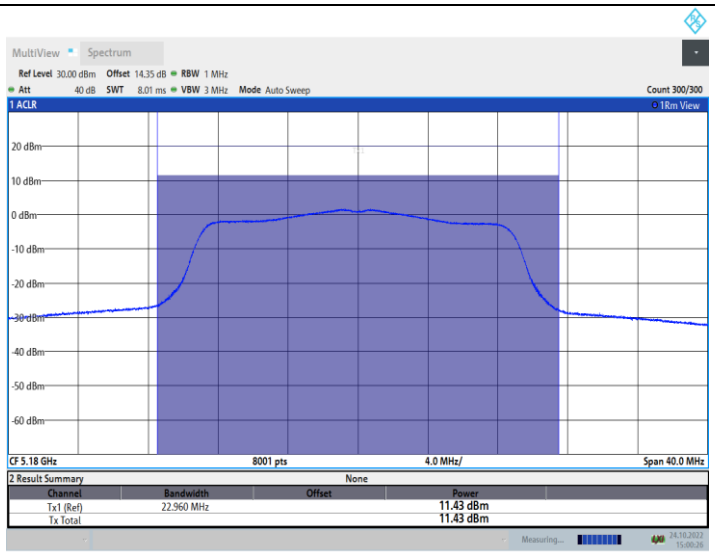

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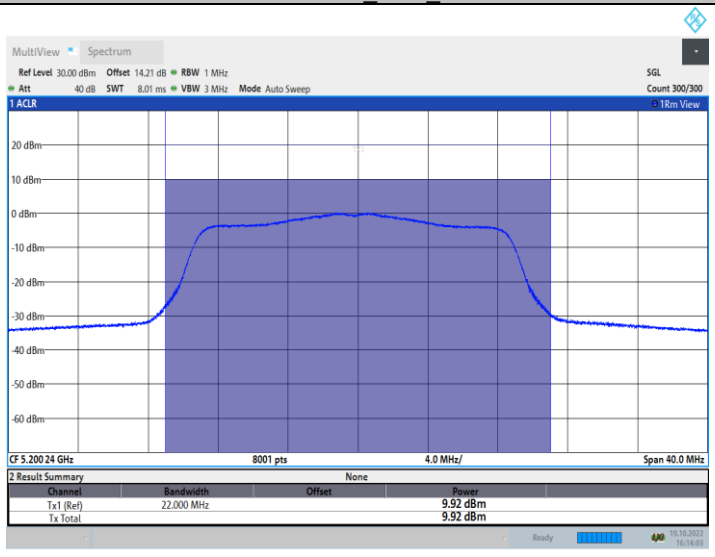

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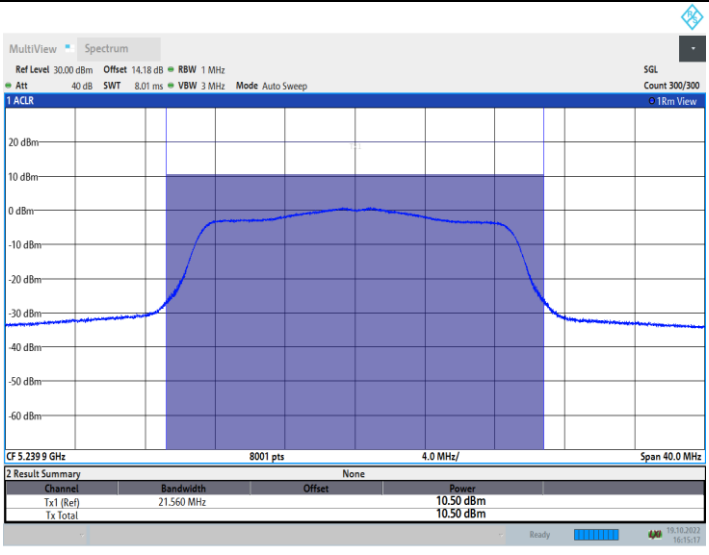

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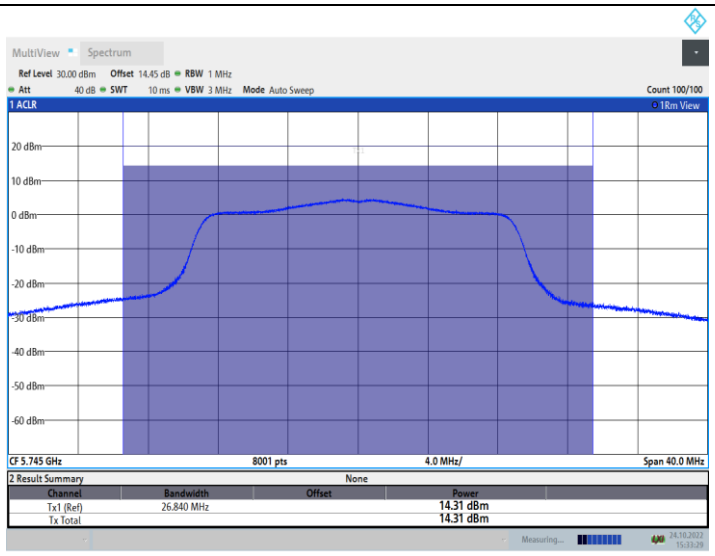

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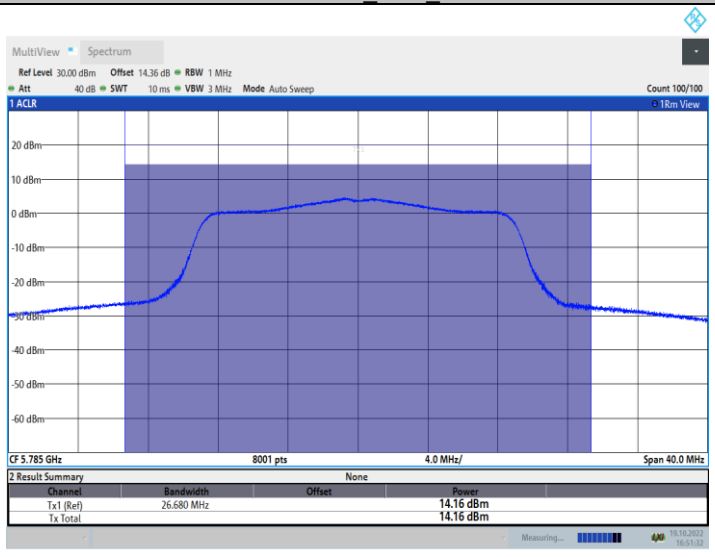

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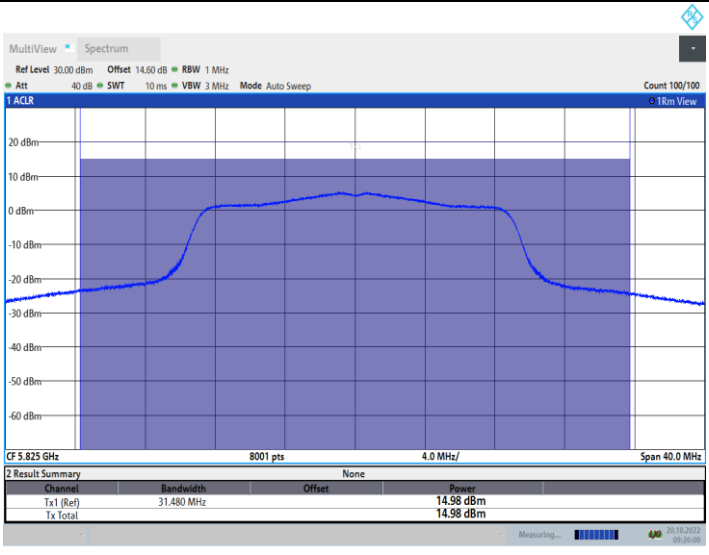

9. MAXIMUM POWER SPECTRAL DENSITY LEVEL MEASUREMENT

9.1. Limits of Maximum Power Spectral Density Level Measurement

CFR 47 (FCC) part 15.407 (a)

For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both

the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both

the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

9.2. Test Procedure

1.Create an average power spectrum for the EUT operating mode being tested by following the instructions in section II.E.2. for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the appropriate test method (SA-1, SA-2, SA-3, or alternatives to each) and apply it up to, but not including, the step labeled, “Compute power….” (This procedure is required even if the maximum conducted output power measurement was performed using a power meter, method PM.)

2. Use the peak search function on the instrument to find the peak of the spectrum and record its value.

3. Make the following adjustments to the peak value of the spectrum, if applicable:

a) If Method SA-2 or SA-2 Alternative was used, add 10 log (1/x), where x is the duty cycle, to the peak of the spectrum.

b) If Method SA-3 Alternative was used and the linear mode was used in step II.E.2.g)(viii), add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.

4. The result is the Maximum PSD over 1 MHz reference bandwidth.

5. For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the

above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in § 15.407(a)(5). For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or

500 kHz, “provided that the measured power is integrated over the full reference bandwidth” to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and 789033 D02 General UNII Test Procedures New Rules v01r02 Page 10 integrated over 1 MHz, or 500 kHz bandwidth, the following adjustments to the procedures apply:
a) Set RBW ≥ 1/T, where T is defined in section II.B.l.a).
b) Set VBW ≥ 3 RBW.
c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10 log (500 kHz/RBW) to the measured result, whereas RBW (< 500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add
10 log (1MHz/RBW) to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.
e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.
Note: As a practical matter, it is recommended to use reduced RBW of 100 kHz for the sections
5.c) and 5.d) above, since RBW=100 KHZ is available on nearly all spectrum analyzers.

9.3. Test Data

Table 10 Maximum Power Spectral Density Level Test Data

TestMode	Antenna	Channel	Result	Limit	Verdict
11A	Ant1	5180	2.27	≤11.00	PASS
		5200	0.64	≤11.00	PASS
		5240	1.15	≤11.00	PASS
		5745	1.59	≤30.00	PASS
		5785	2.11	≤30.00	PASS
		5825	2.24	≤30.00	PASS
11N20SISO	Ant1	5180	1.69	≤11.00	PASS
		5200	0.19	≤11.00	PASS
		5240	0.9	≤11.00	PASS
		5745	1.94	≤30.00	PASS
		5785	1.89	≤30.00	PASS
		5825	2.65	≤30.00	PASS
11AC20SISO	Ant1	5180	1.75	≤11.00	PASS
		5200	0.28	≤11.00	PASS
		5240	0.85	≤11.00	PASS
		5745	1.91	≤30.00	PASS
		5785	1.68	≤30.00	PASS
		5825	2.47	≤30.00	PASS

Note：1. The Result and Limit Unit is dBm/500 kHz in the band 5.725-5.85 GHz.
2. The Duty Cycle Factor and RBW Factor is compensated in the graph.

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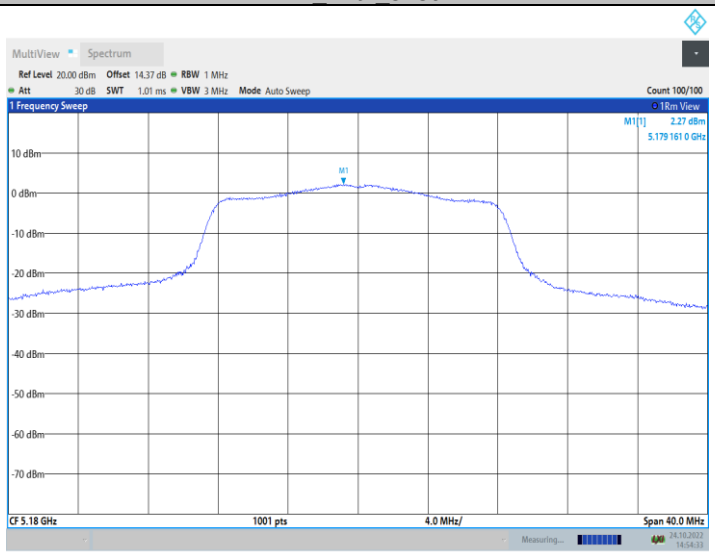 14:54:33 24.10.2022
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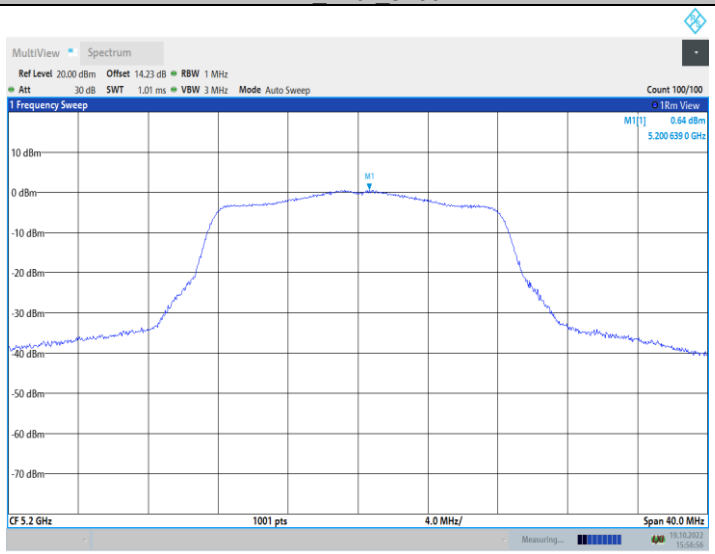 15:56:56 19.10.2022
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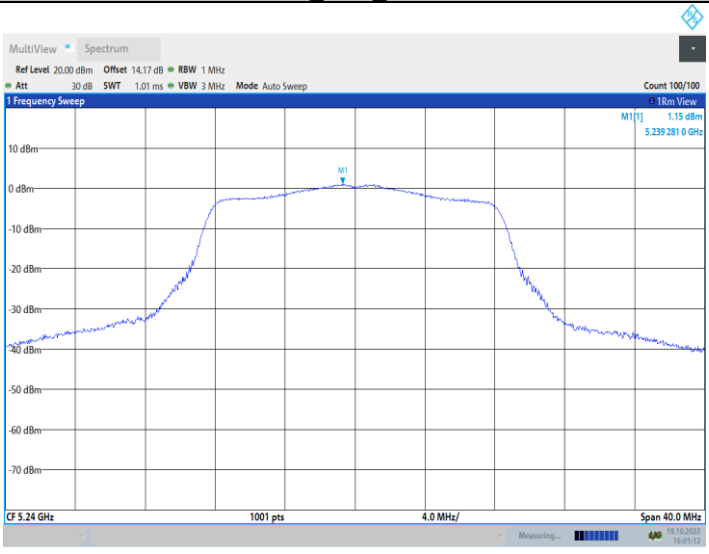 16:01:13 19.10.2022
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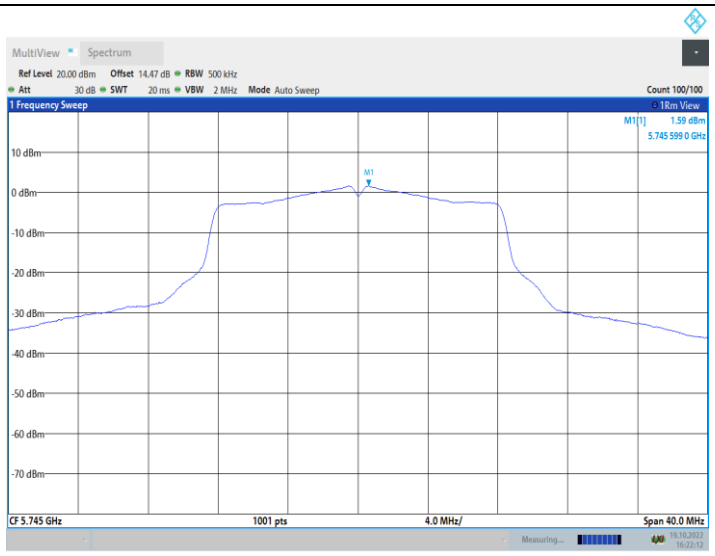

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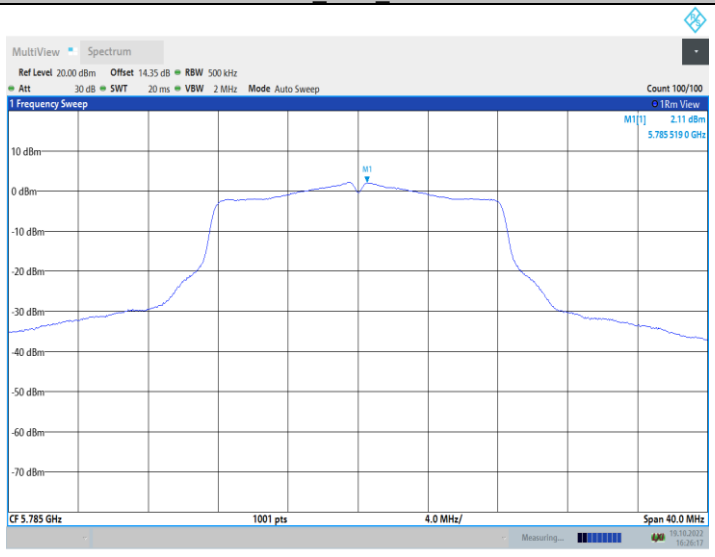

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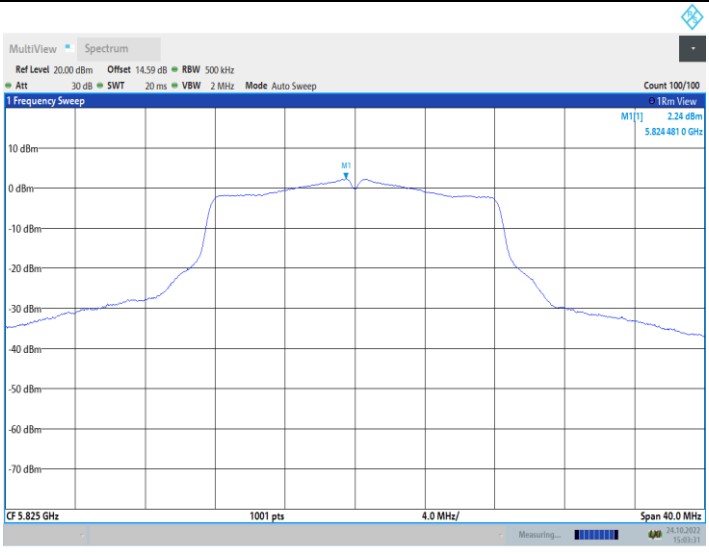

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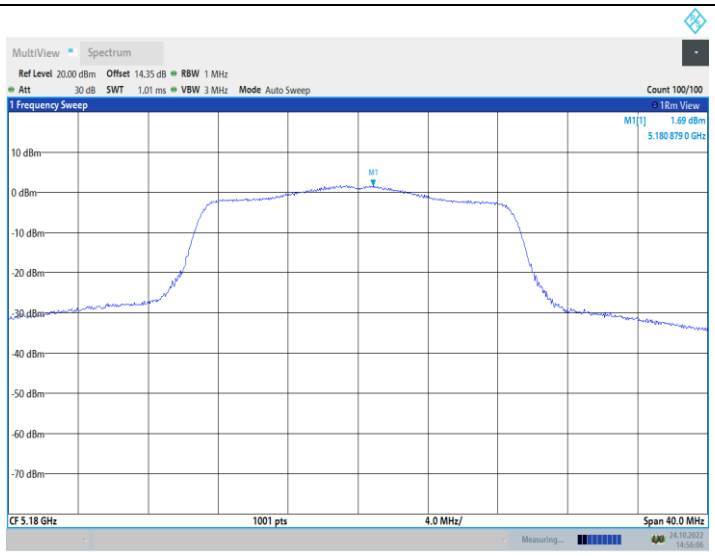

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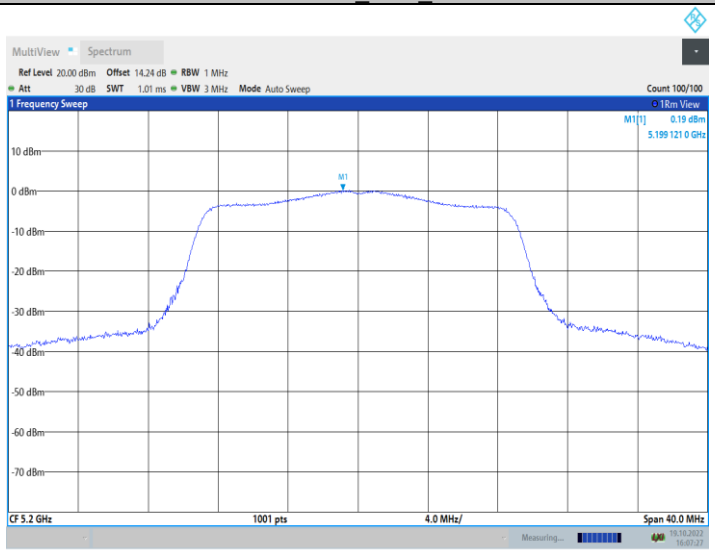

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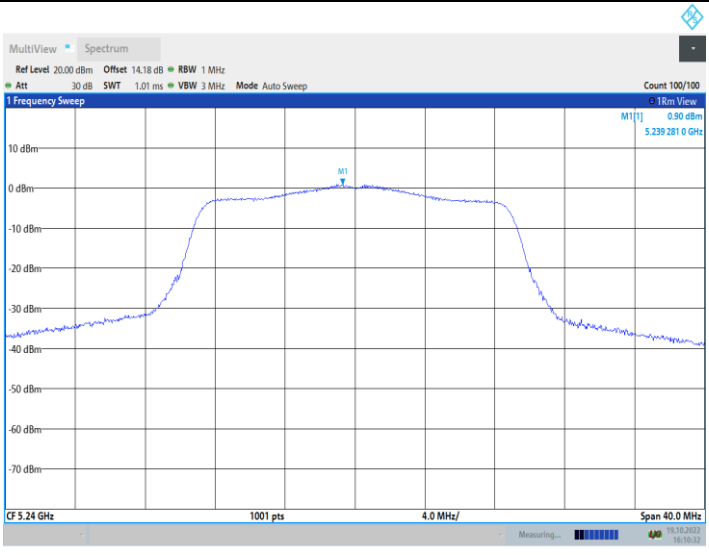

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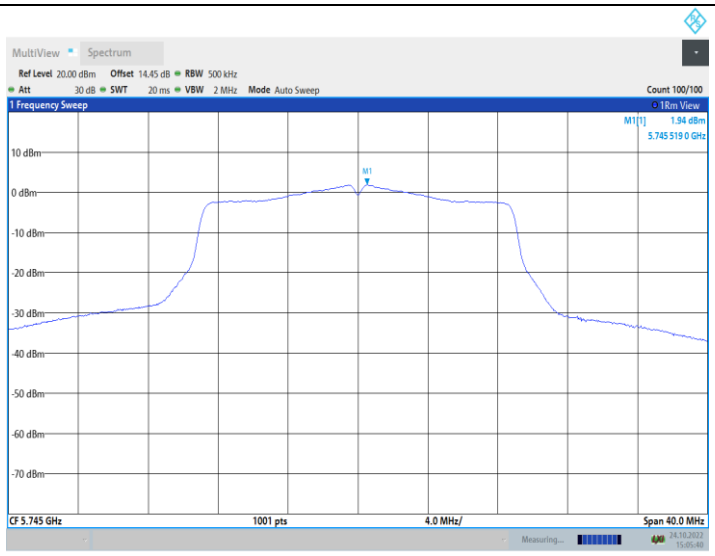

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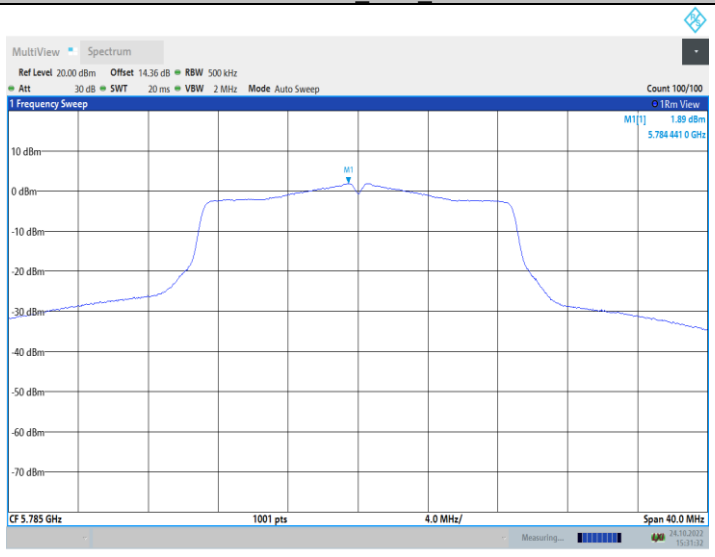

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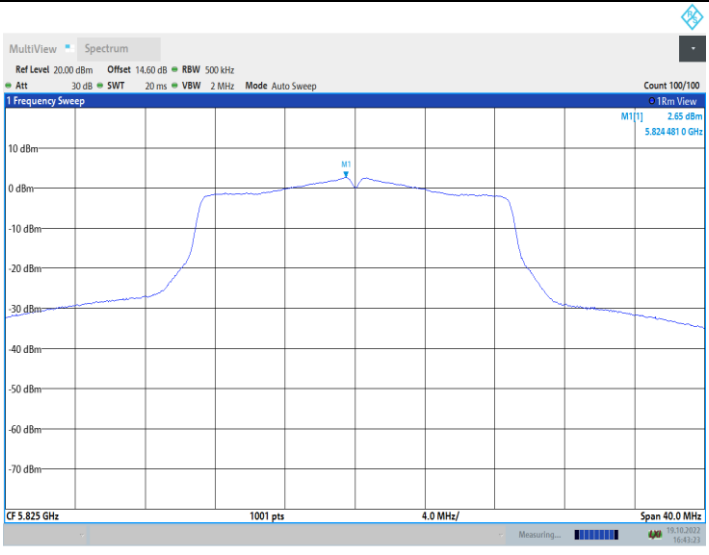

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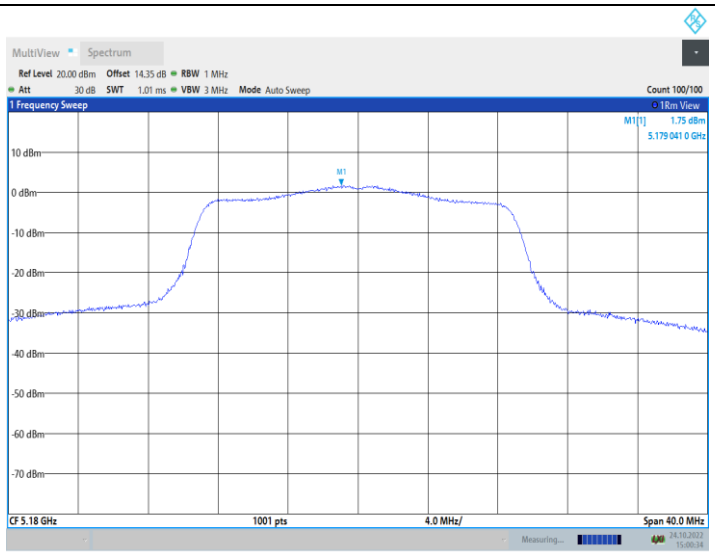

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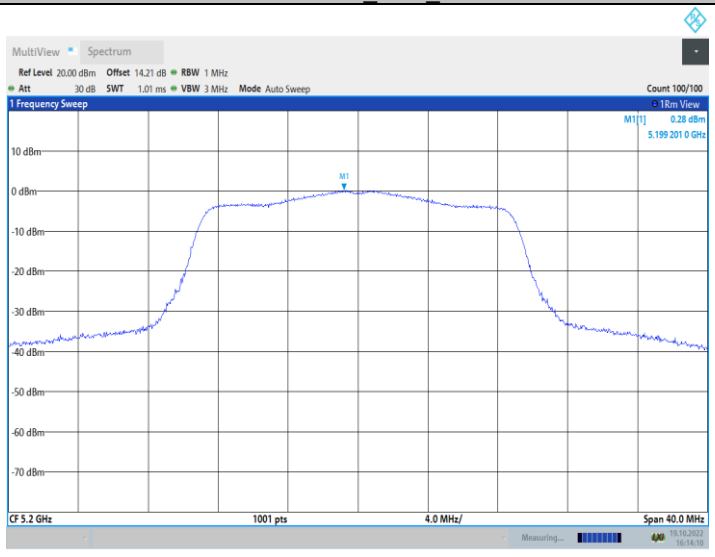

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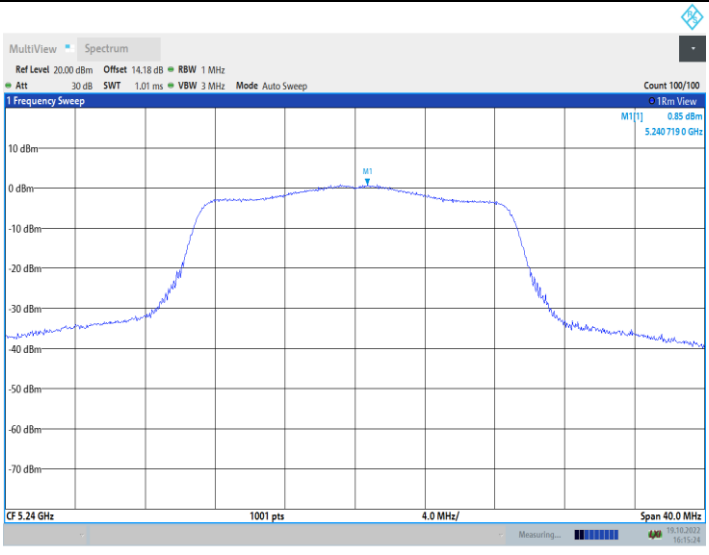

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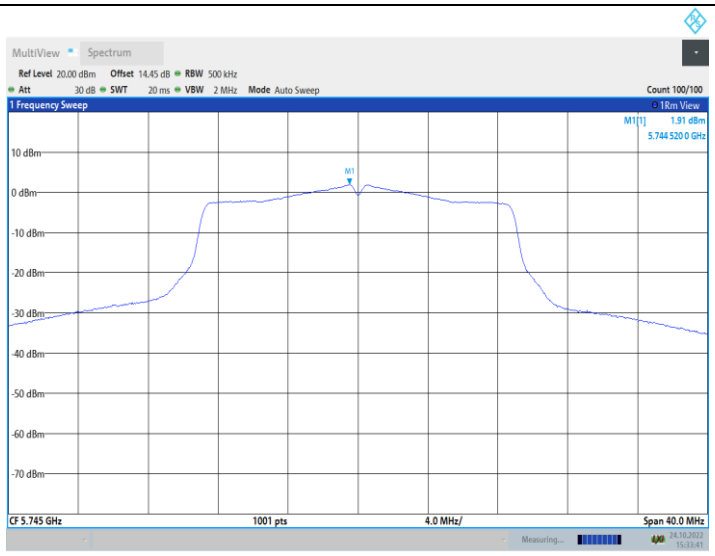

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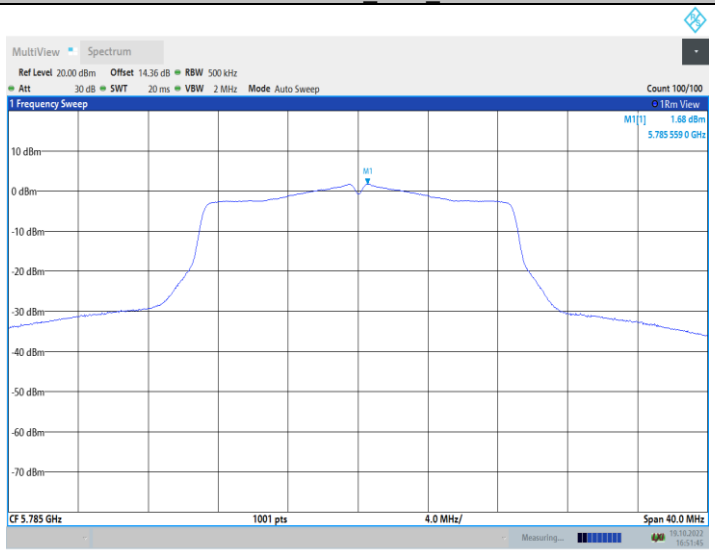

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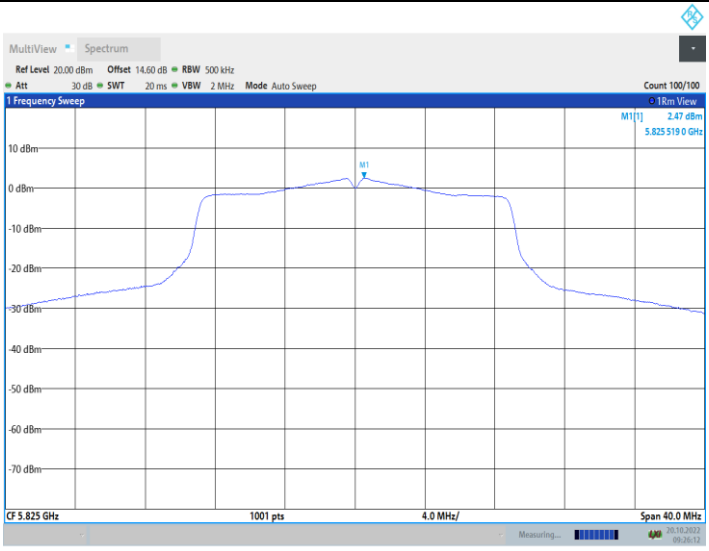
11AC20SISO_Ant1_5825



09:26:13 20.10.2022

10. RADIATED BANDEDGE AND SPURIOUS MEASUREMENT

10.1. LIMITS OF Radiated Bandedge and Spurious Measurement

FCC Part 15.205 and 15.209

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

FCC Part 15.407(b)
For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

10.2. TEST PROCEDURE

1. The testing follows the guidelines in ANSI C63.10-2020.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. For measurement below 1GHz, the EUT was placed on a turntable with 0.8 meter,above ground. For measurement above 1 GHz, test at FAR, the EUT is placed on a non-conductive table, which is 1.5 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. Use the following spectrum analyzer settings:
(1) Span shall wide enough to fully capture the emission being measured;
(2) Set RBW=100 kHz for f < 1 GHz; VBW >= RBW; Sweep = auto; Detector function = peak; Trace = max hold;
(3) Set RBW = 1 MHz, VBW= 3MHz for f > 1 GHz for peak measurement.

Set RBW = 1 MHz, and VBW= 1/T (on time) for average measurement.

10.3.TEST DATA

9 kHz-30MHz

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the r esult which was 20dB lower than the limit line per 15.31(o) was not reported.

Table 11 Radiated Emission Test Data 9k Hz-30MHz

Frequency (MHz)	Cable Loss +preamp (dB)	Antenna Factor (dB)	Reading (dBμV/m)	Level (dBμV/m)	Polarity (Horizontal/ Vertical)	Limit (dBμV/m)	Margin (dB)	Note
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--

30MHz-1GHz

Worst case is shown below for 30MHz-1GHz only.

The emissions don't show in following result tables are more than 20dB below the limits.

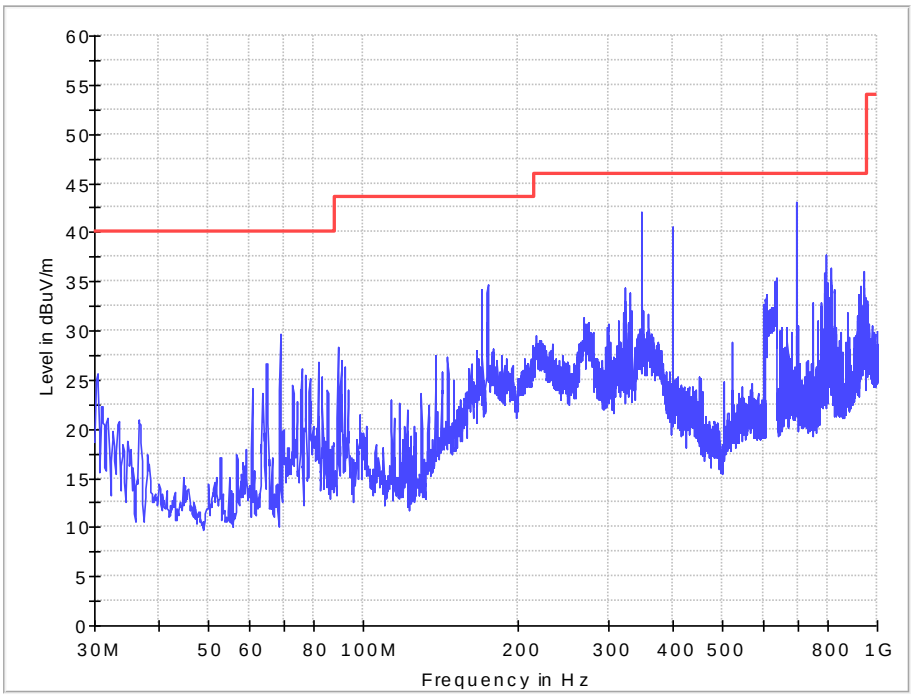
Table 12 Radiated Emission Test Data 30MHz-1GHz

Frequency (MHz)	Cable Loss +preamp (dB)	Antenna Factor (dB)	Reading (dBμV/m)	Level (dBμV/m)	Polarity (Horizontal/ Vertical)	Limit (dBμV/m)	Margin (dB)	Note
32.182	0.7	12.3	21.2	34.2	Vertical	40.0	5.8	QP
137.912	1.3	8.9	22.6	32.8	Vertical	43.5	10.7	QP
328.881	2.2	13.3	19.9	35.4	Vertical	46.0	10.6	QP
349.008	2.3	14.1	22.7	39.1	Vertical	46.0	6.9	QP
399.993	2.4	14.6	25.2	42.2	Vertical	46.0	3.8	QP
698.087	3.3	18.5	21.0	42.8	Vertical	46.0	3.2	QP
68.921	0.9	10.7	14.6	26.2	Horizontal	40	13.8	QP
174.53	1.5	9.0	21.1	31.6	Horizontal	43.5	11.9	QP
349.008	2.3	14.1	23.9	40.3	Horizontal	46	5.7	QP
399.933	2.4	14.6	22.6	39.6	Horizontal	46	6.4	QP
697.996	3.3	18.5	20.7	42.5	Horizontal	46	3.5	QP
794.723	3.6	18.8	9.9	32.3	Horizontal	46	13.7	QP

Remark: Emission level (dBμV)=Read Value(dBμV/m) + Antenna Factor(dB)+ Cable Loss +preamp(dB)

30MHz-1GHz

Horizontal



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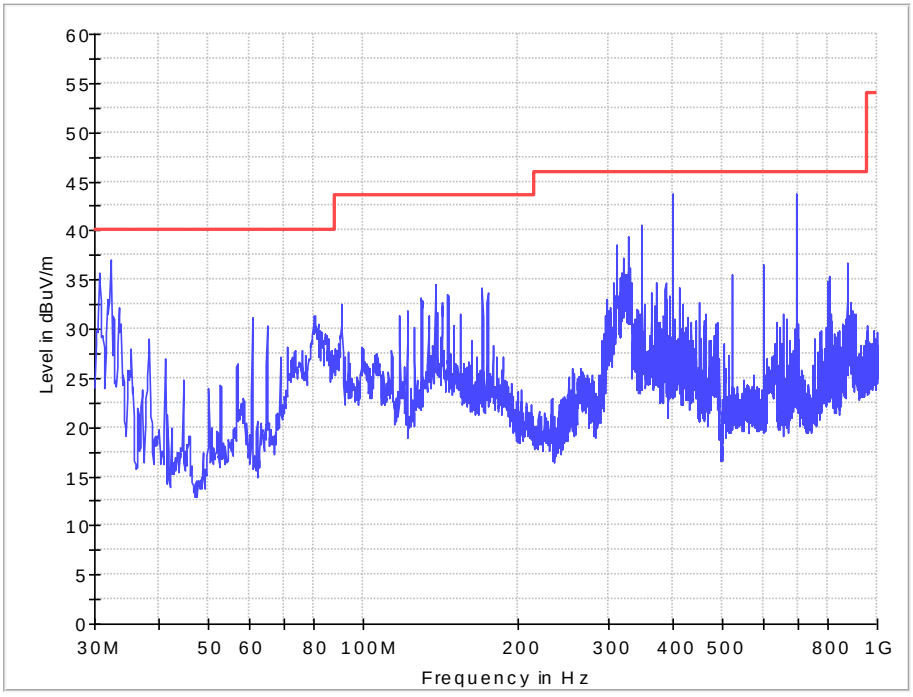
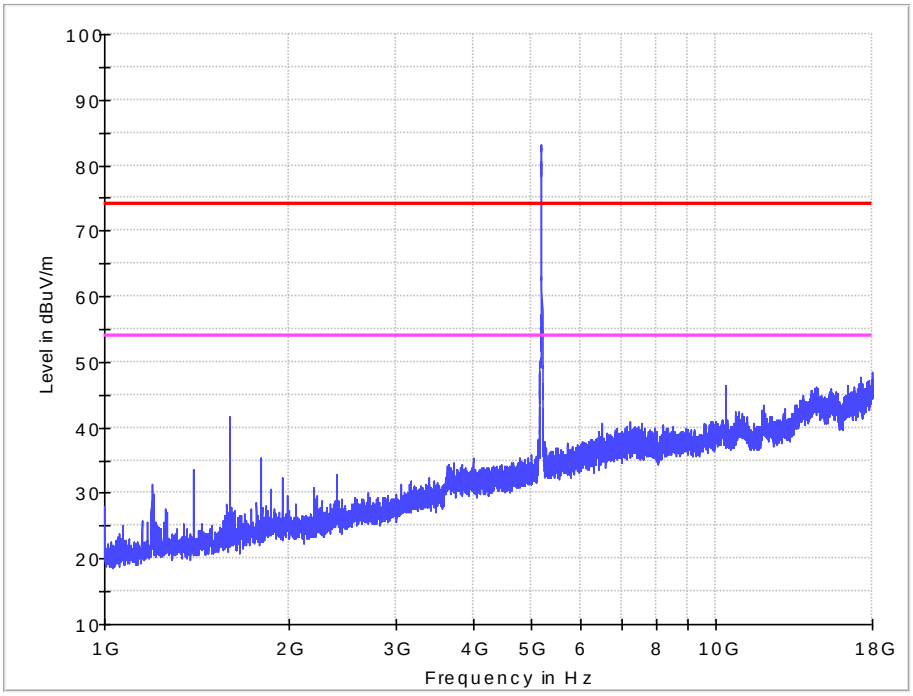


1-18G

11a IN THE 5.2GHz BAND
CH36

Horizontal



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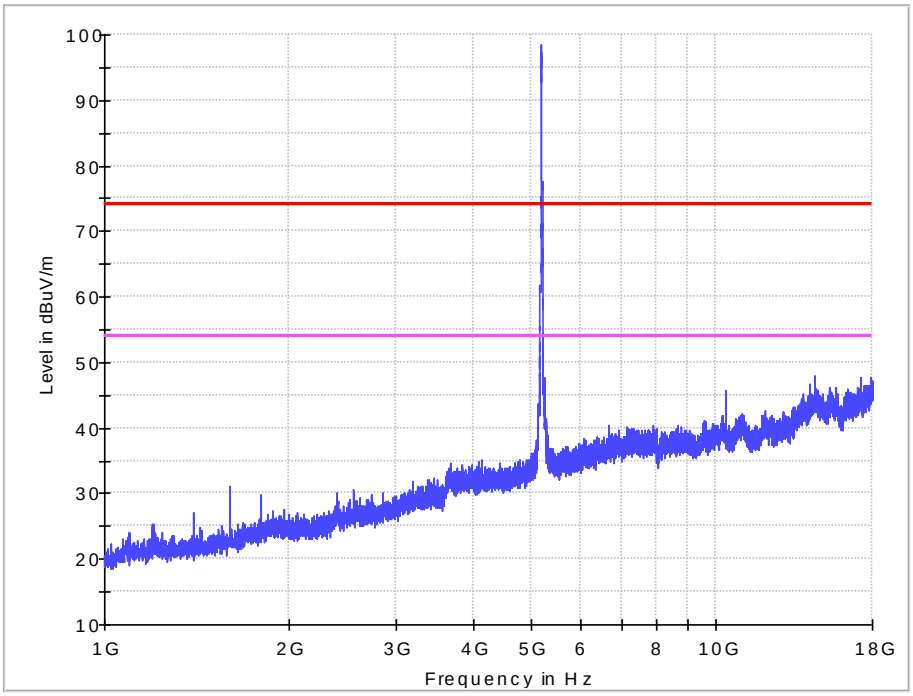
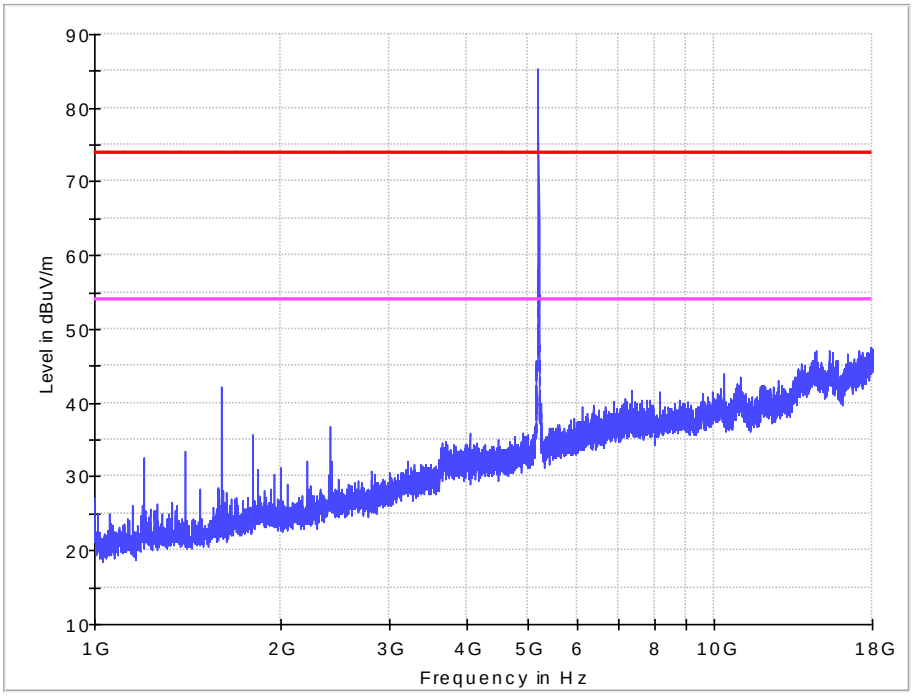


1-18G

11a IN THE 5.2GHz BAND
CH40

Horizontal



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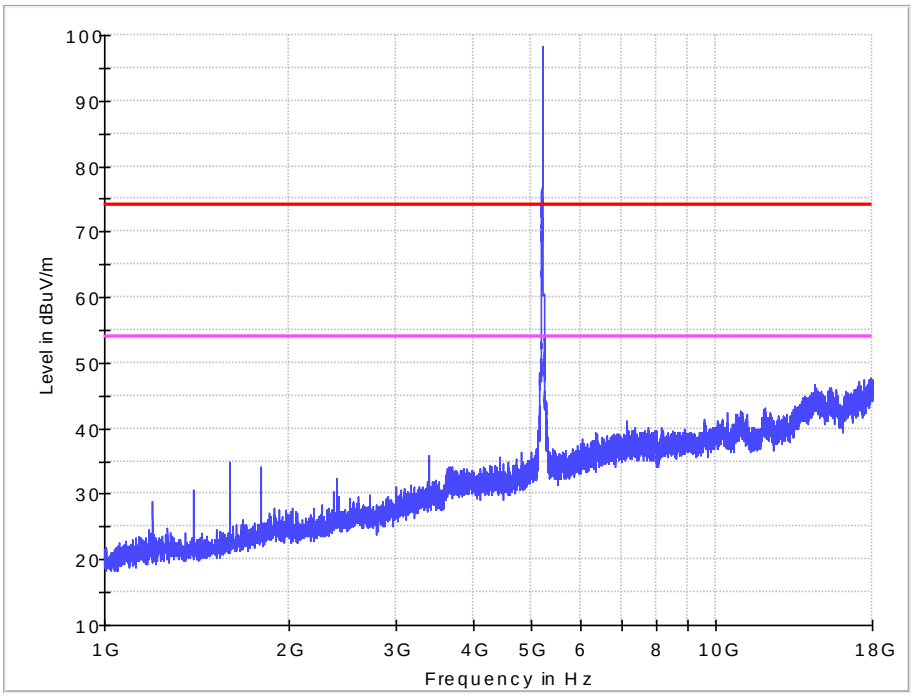
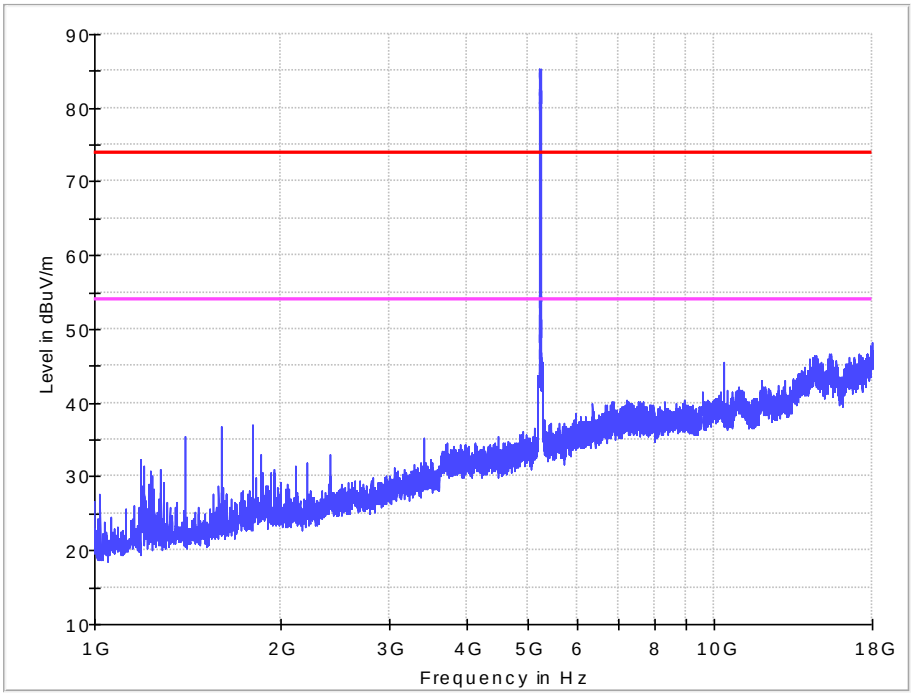


1-18G

11a IN THE 5.2GHz BAND
CH48

Horizontal



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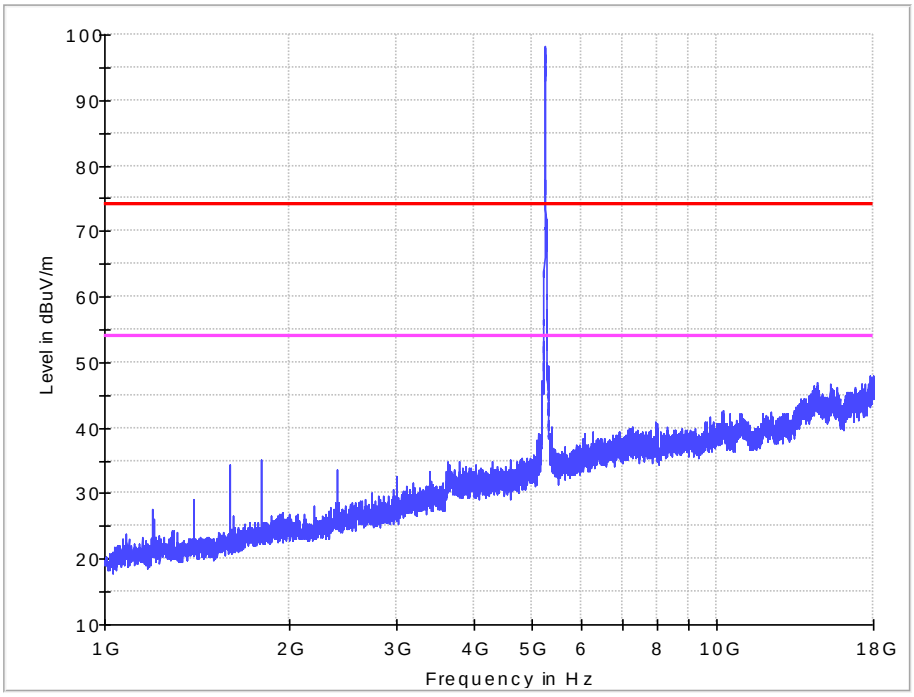
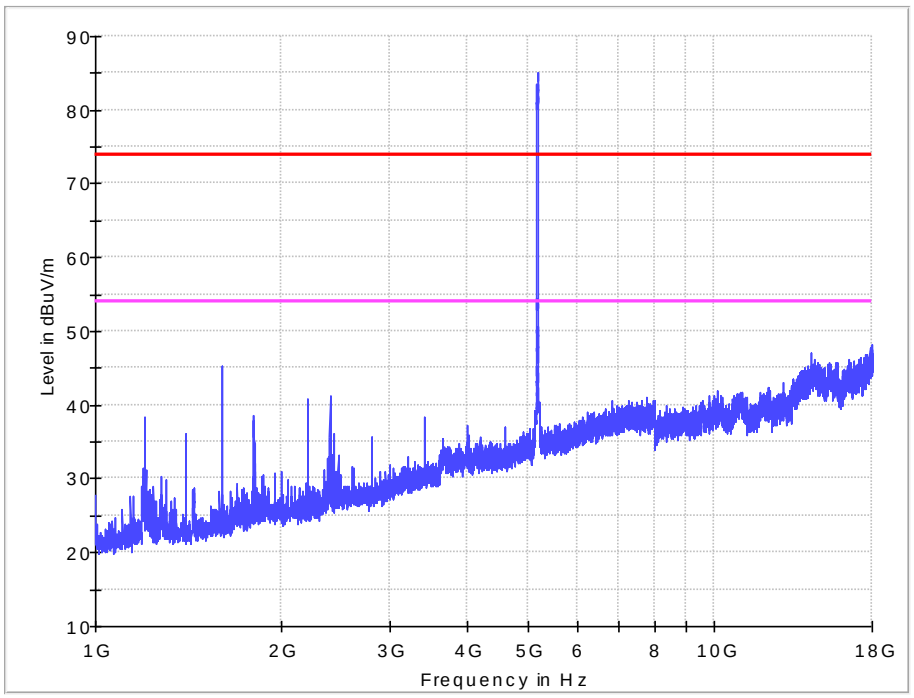


1-18G

11n HT20 IN THE 5.2GHz BAND
CH36

Horizontal



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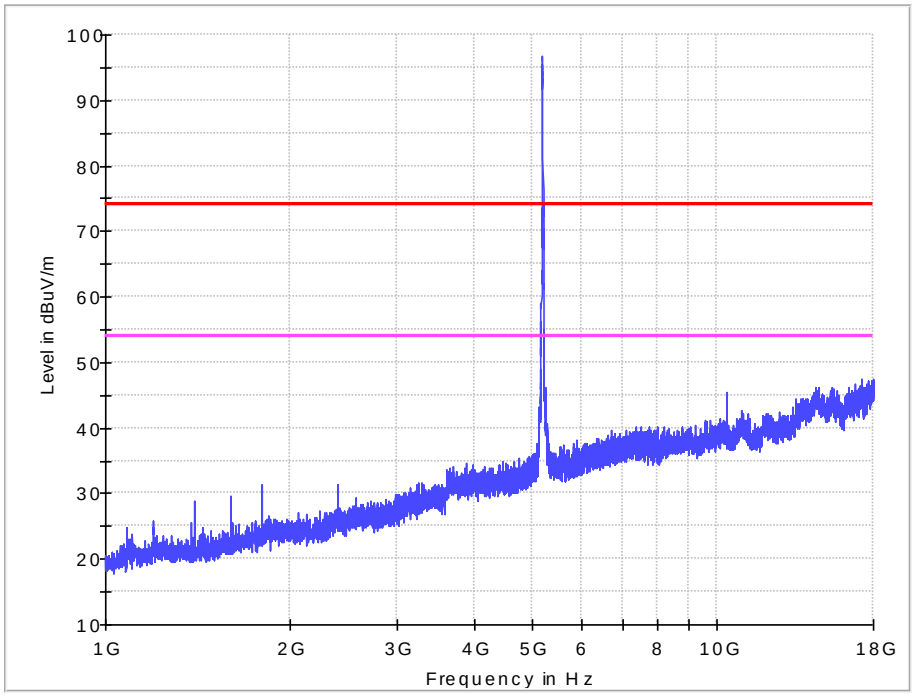
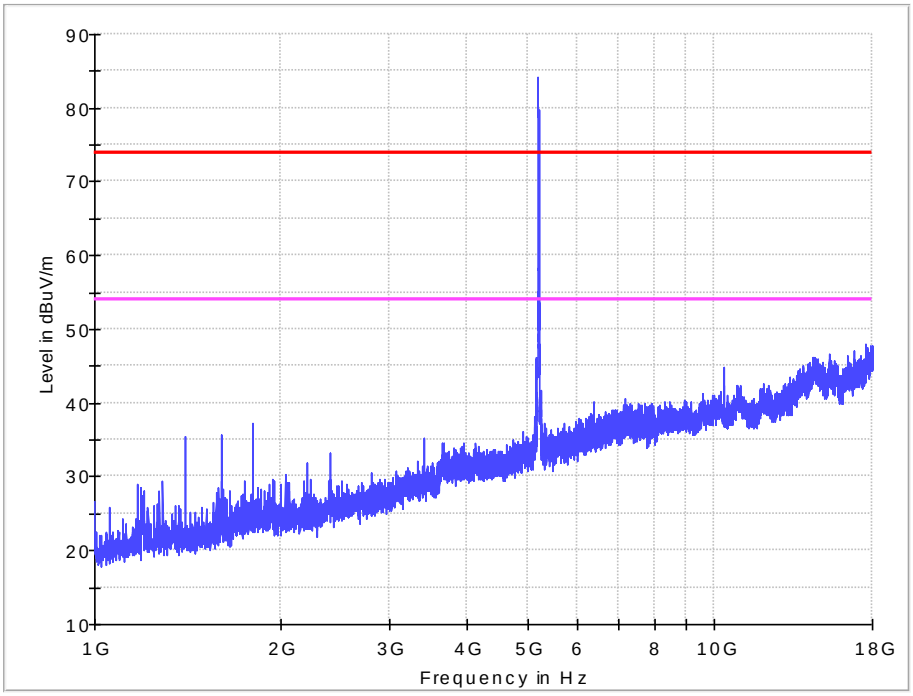


1-18G

11n HT20 IN THE 5.2GHz BAND
CH40

Horizontal



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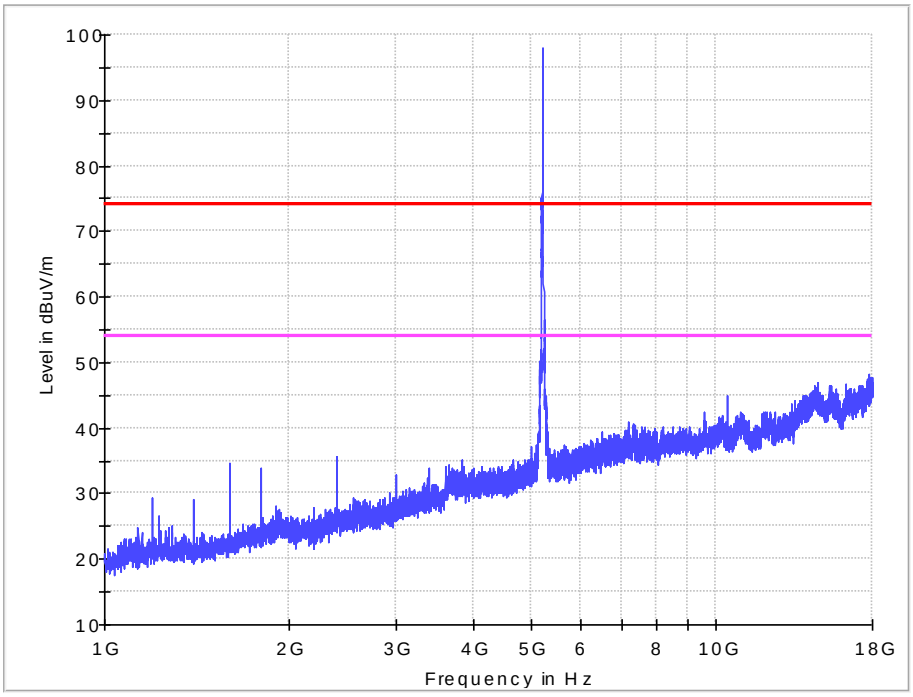
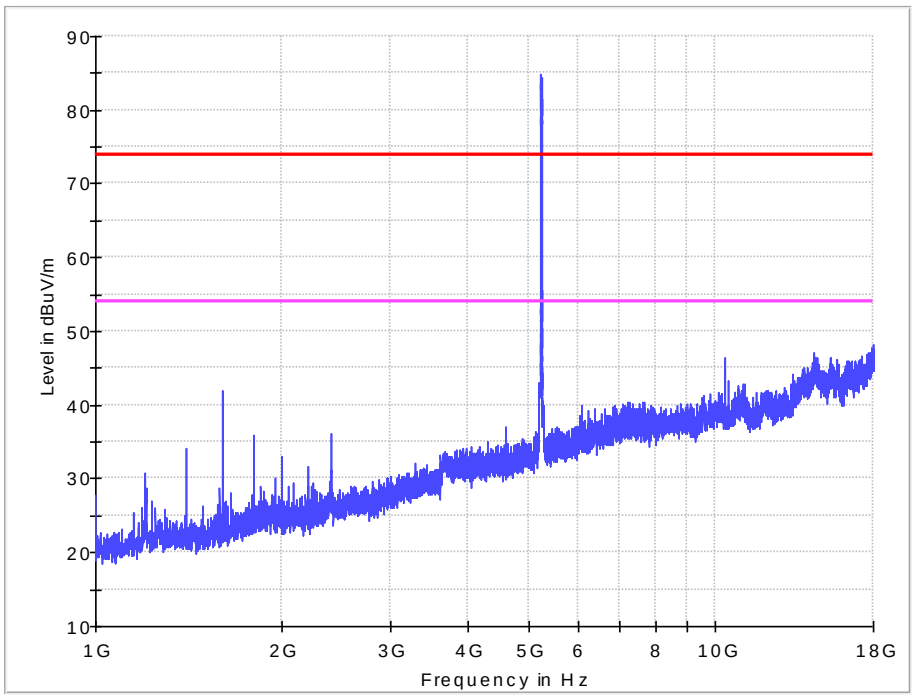


1-18G

11n HT20 IN THE 5.2GHz BAND
CH48

Horizontal



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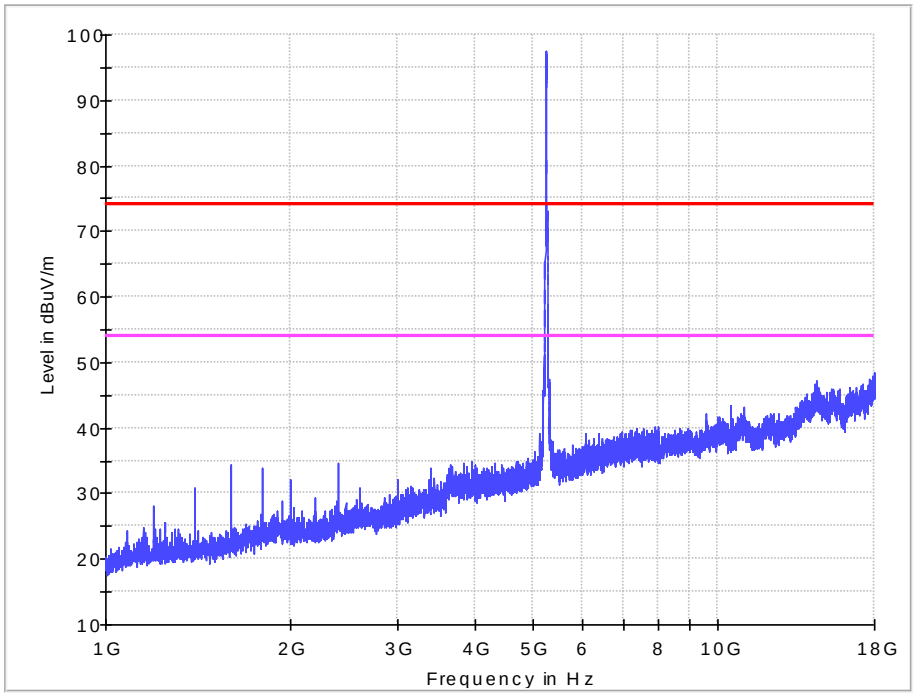
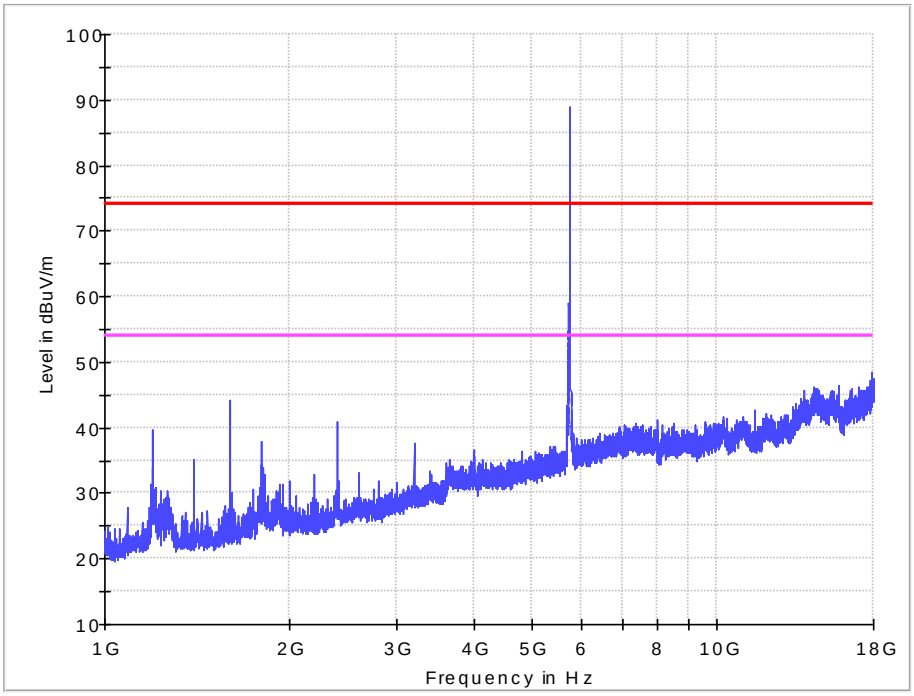


1-18G

11a IN THE 5.8GHz BAND
CH149

Horizontal



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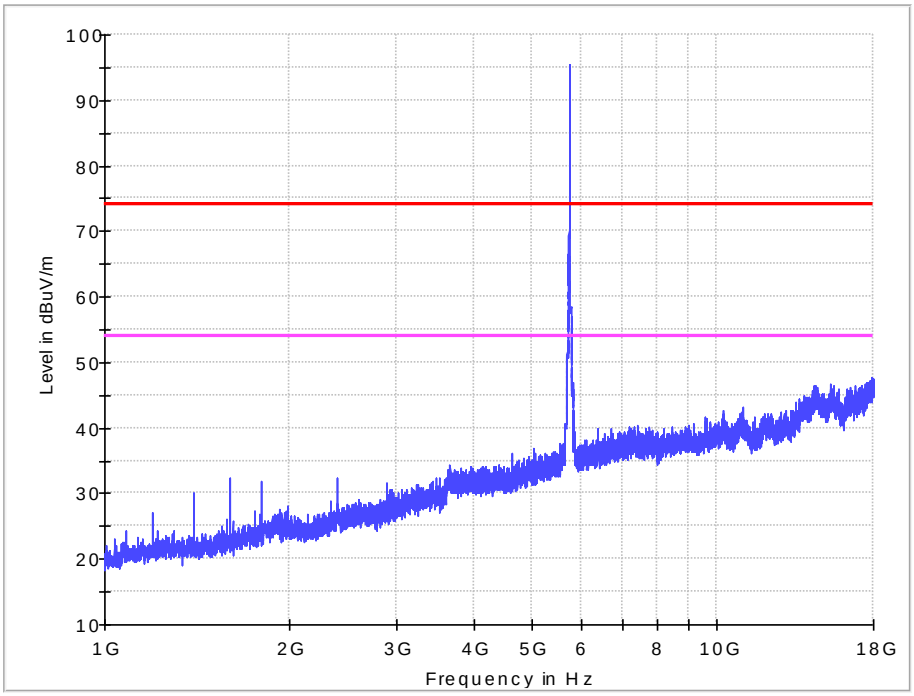

1-18G

11a IN THE 5.8GHz BAND
CH157

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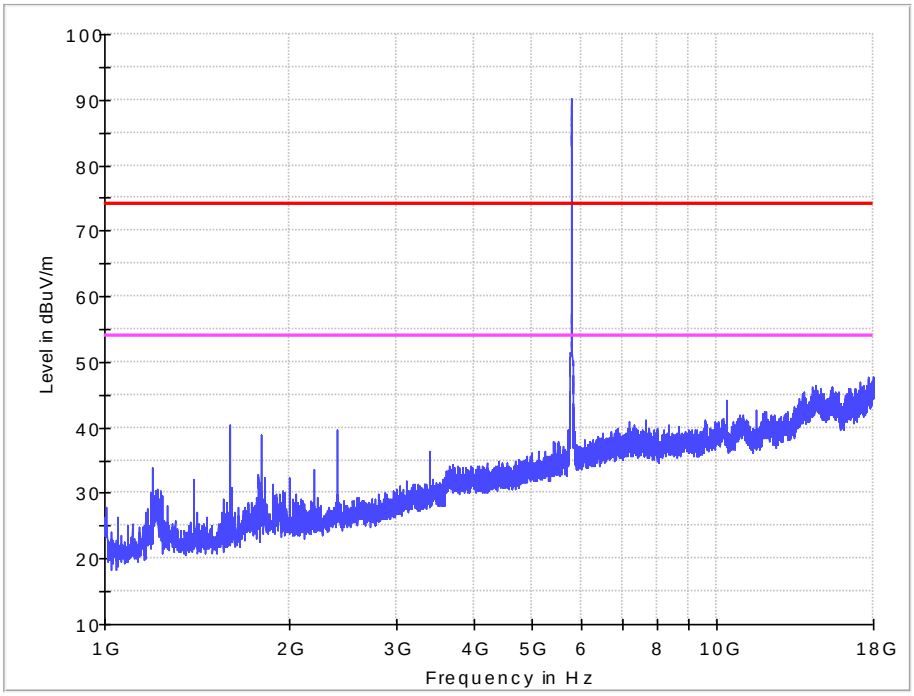

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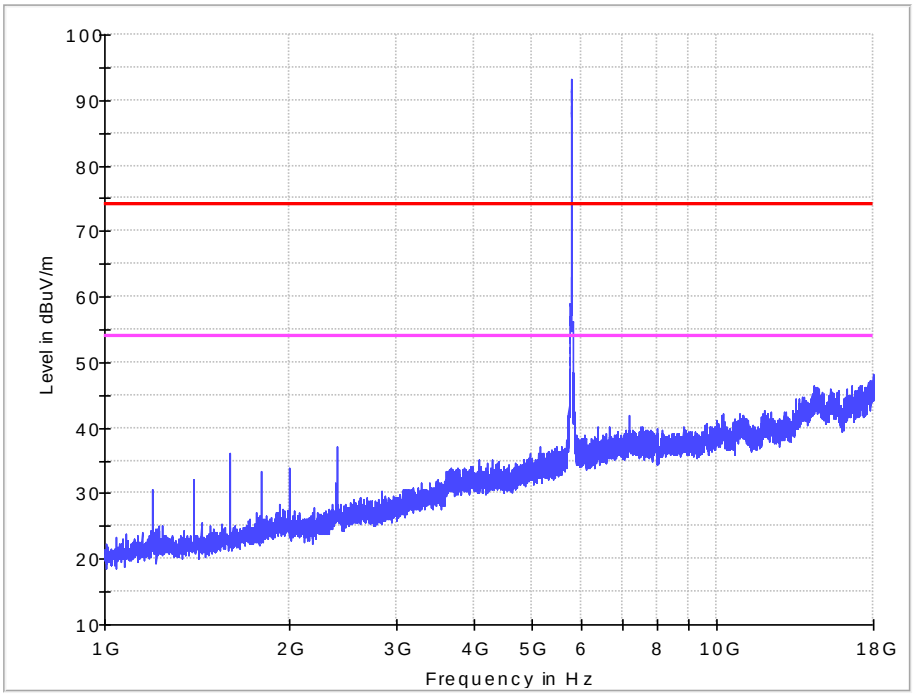

1-18G

11a IN THE 5.8GHz BAND
CH165

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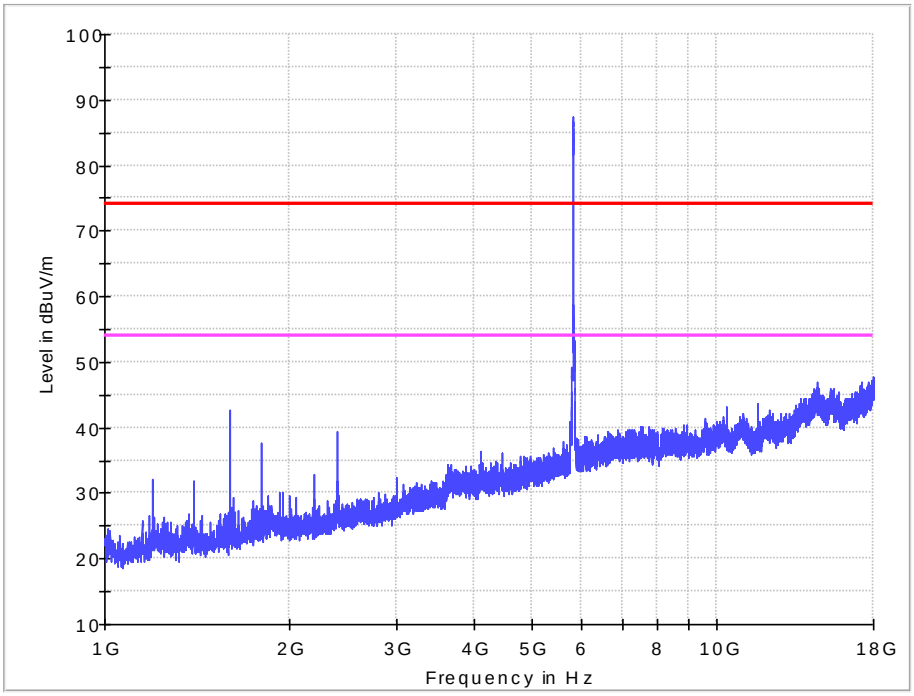

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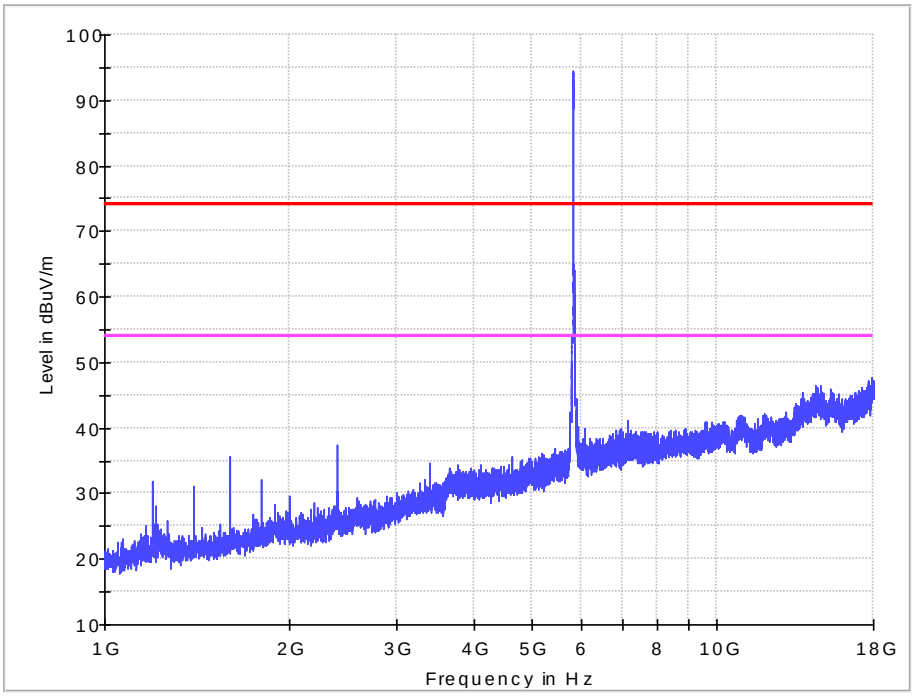
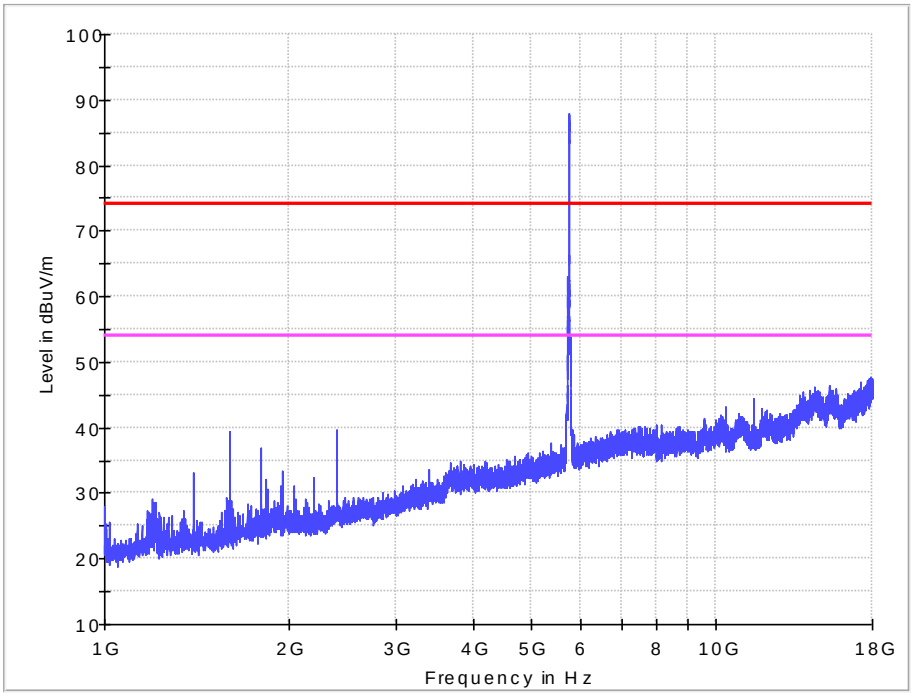


1-18G

11n HT20 IN THE 5.8GHz BAND
CH149

Horizontal



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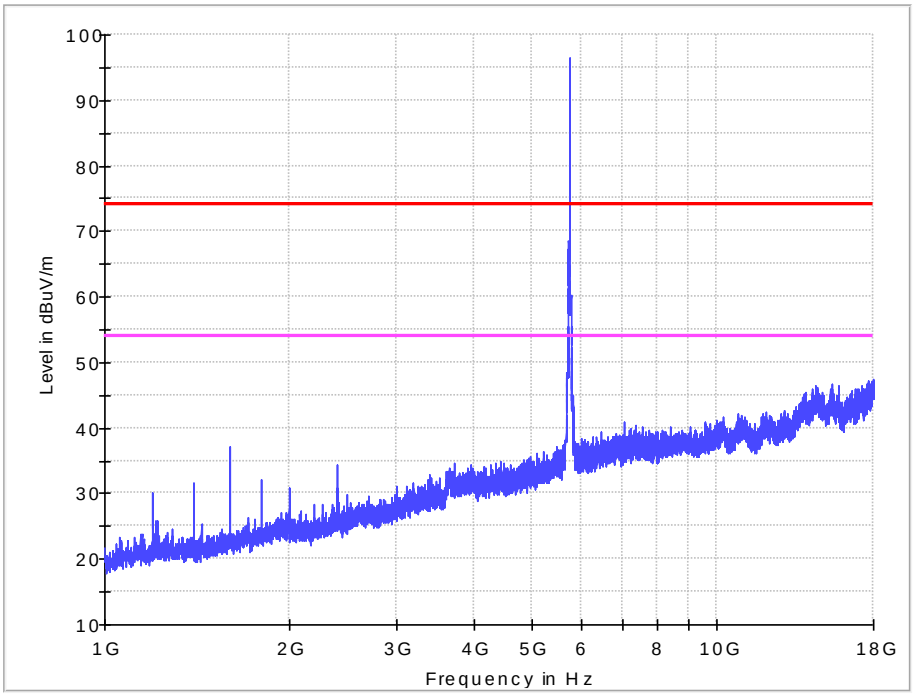
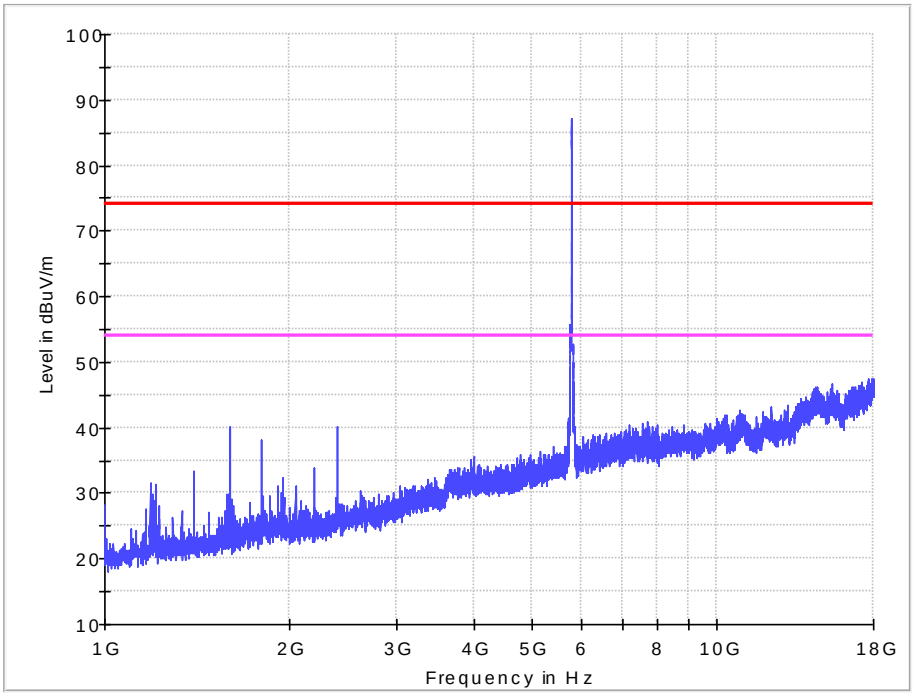


1-18G

11n HT20 IN THE 5.8GHz BAND
CH157

Horizontal



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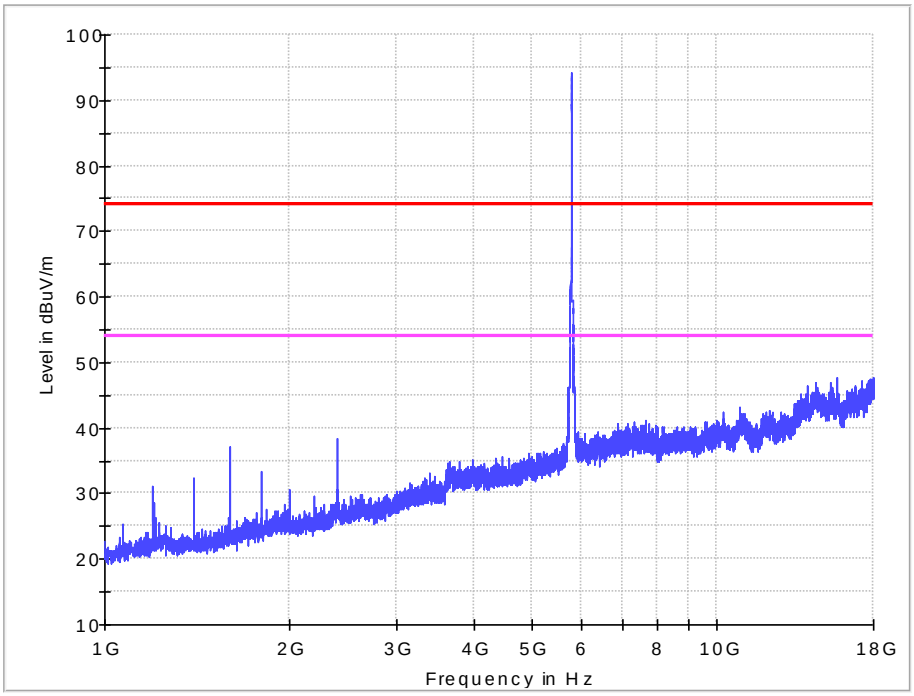

1-18G

11n HT20 IN THE 5.8GHz BAND
CH165

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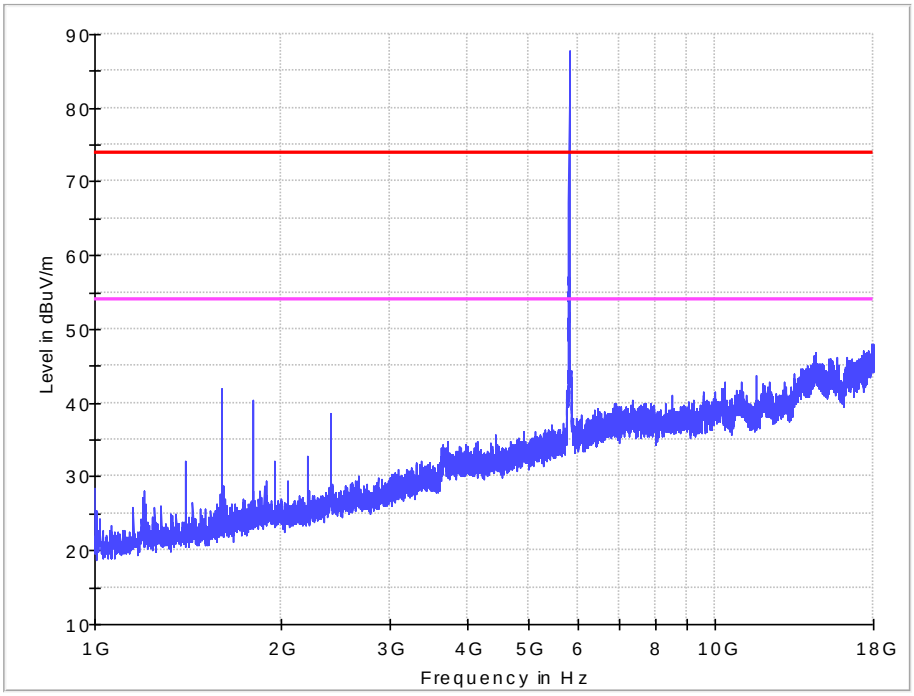

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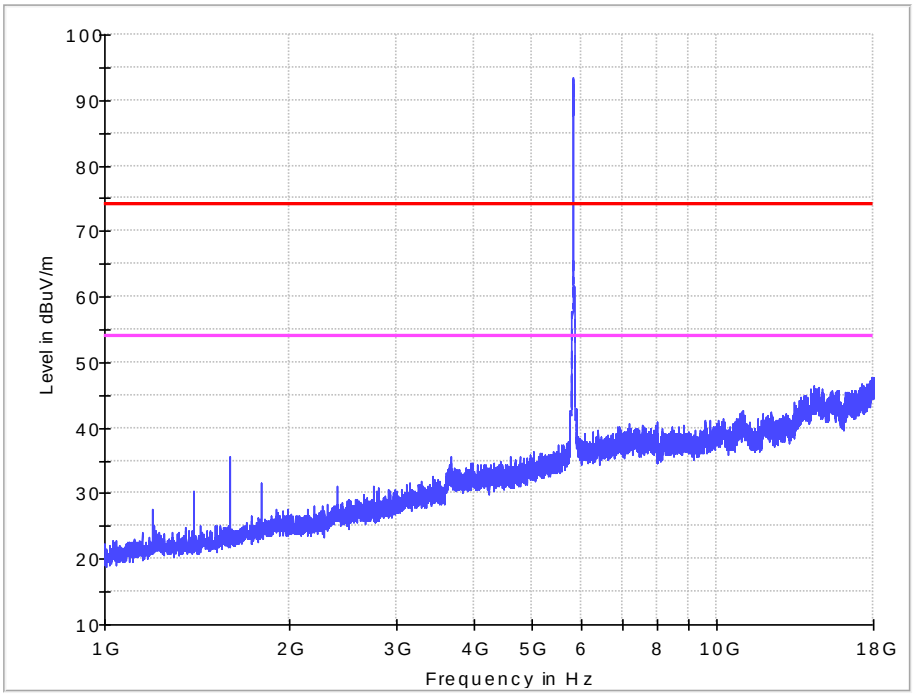
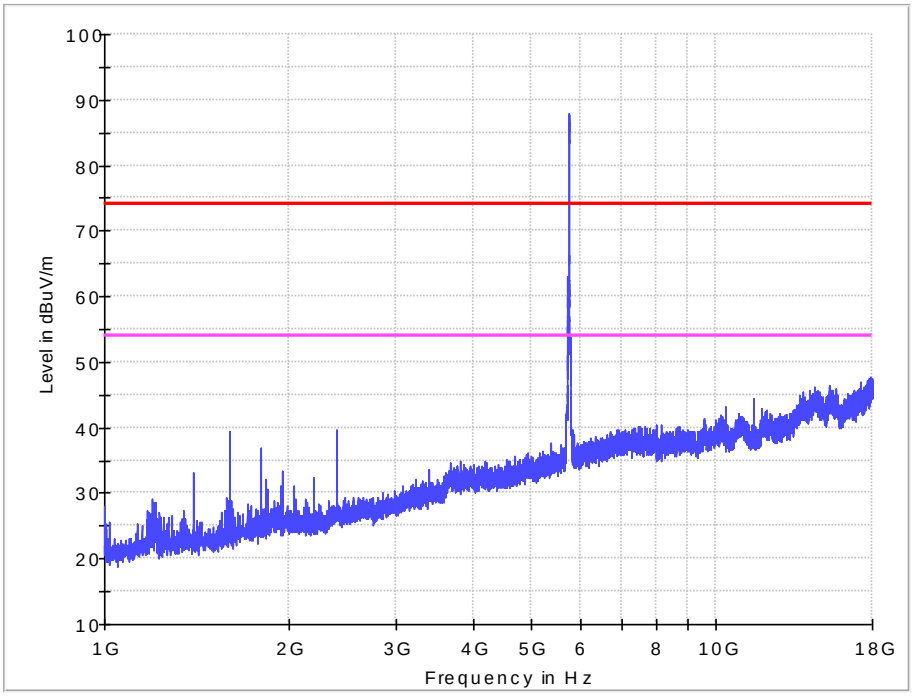


1-18G

11ac VHT20 IN THE 5.8GHz BAND
CH149

Horizontal



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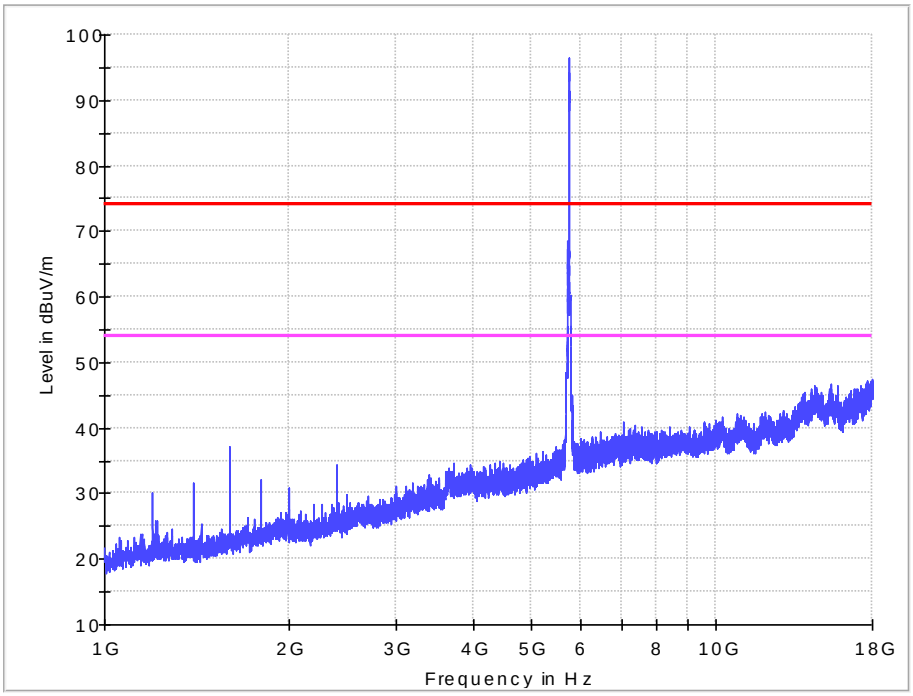
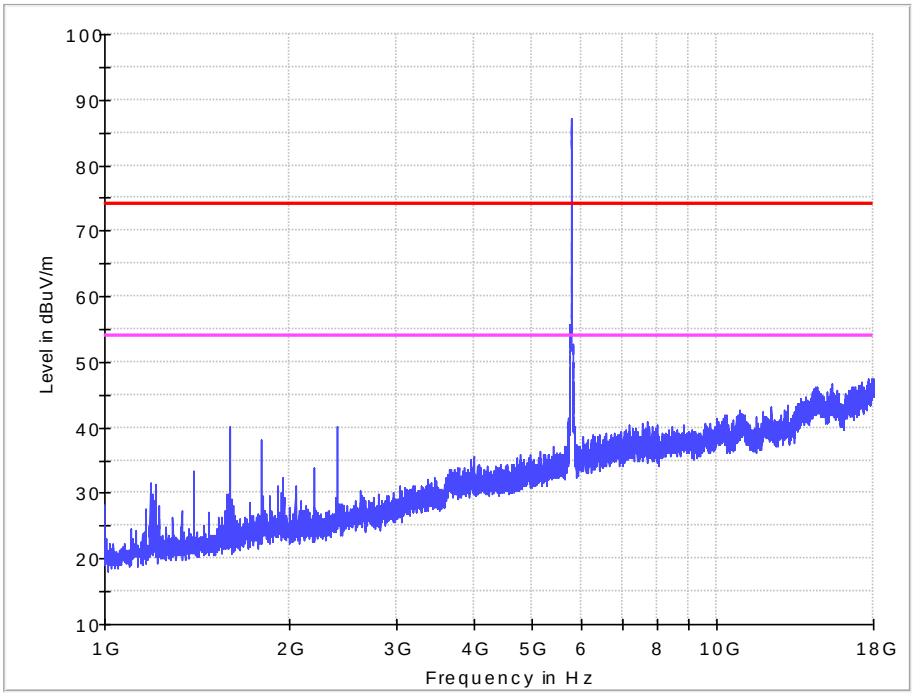


1-18G

11ac VHT20 IN THE 5.8GHz BAND
CH157

Horizontal



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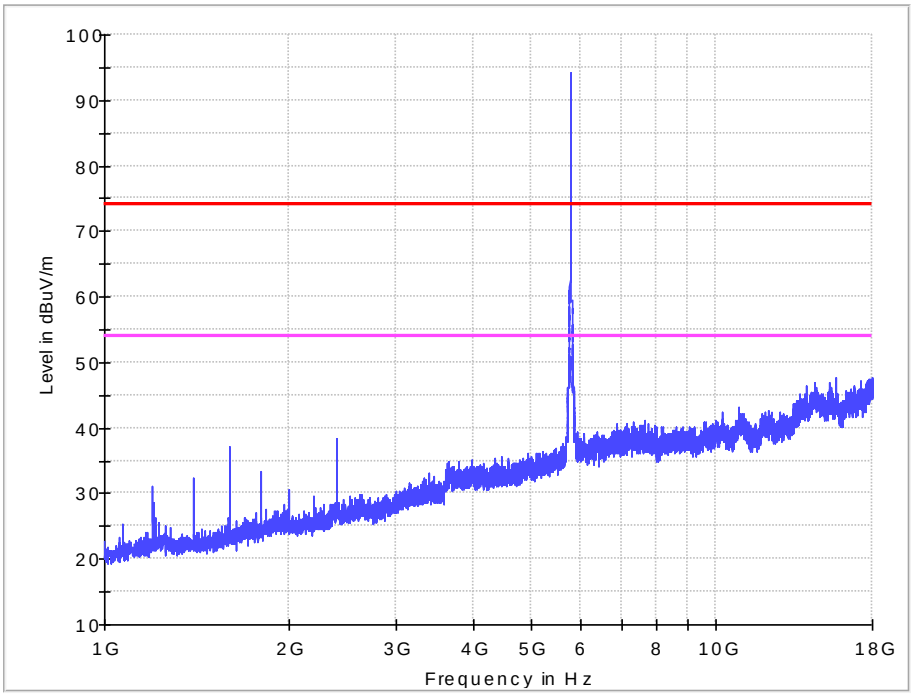
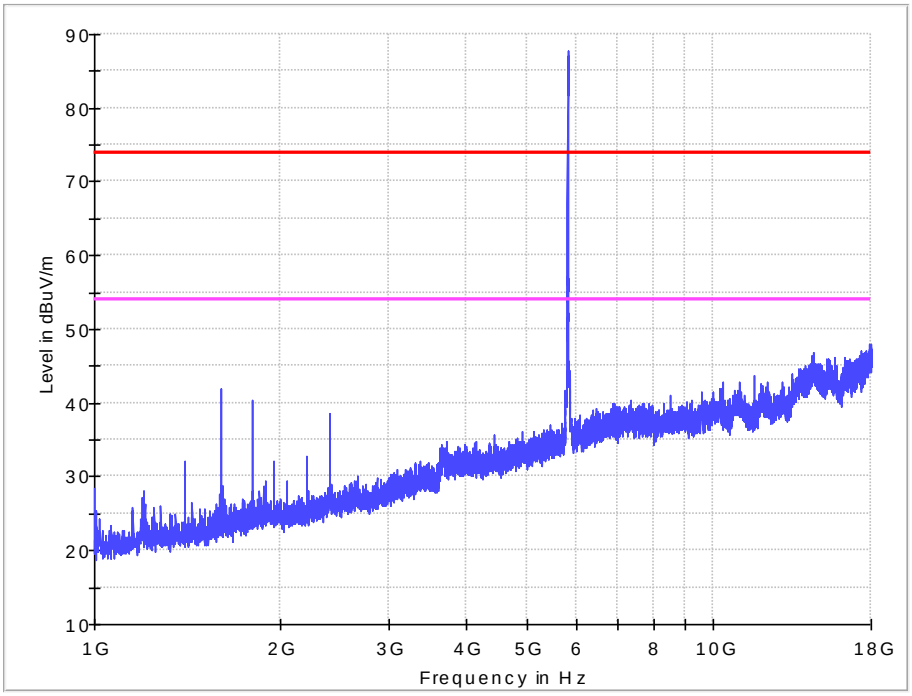


1-18G

11ac VHT20 IN THE 5.8GHz BAND
CH165

Horizontal



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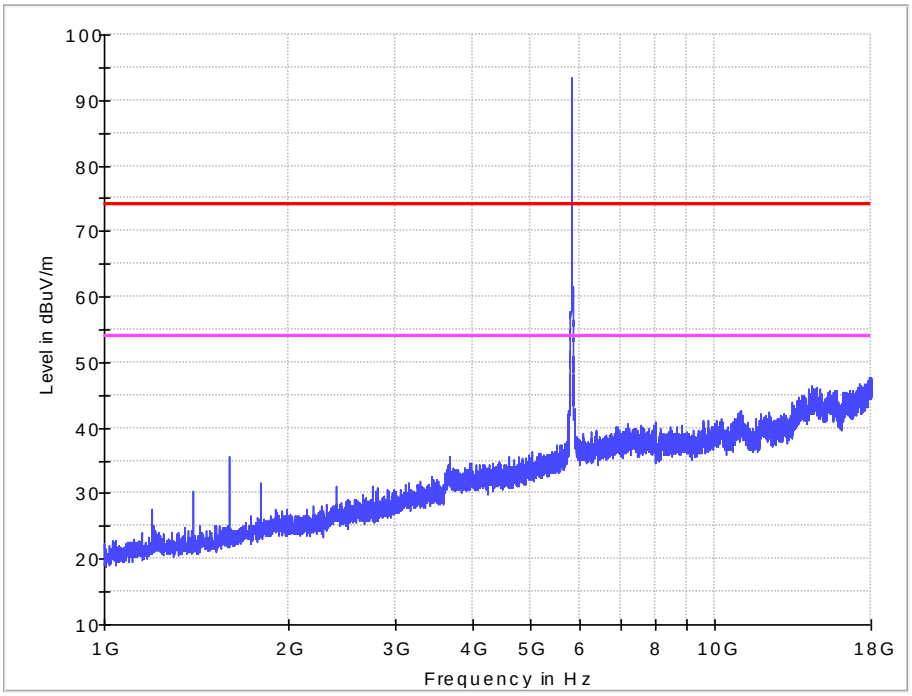
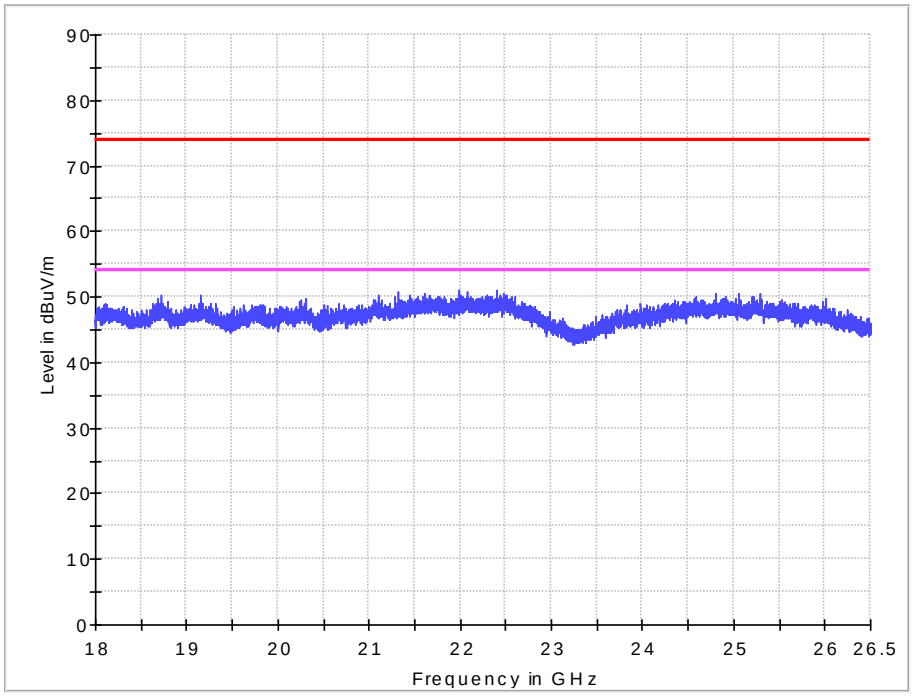


18GHz - 26.5GHz

(Worst Case)
Horizontal



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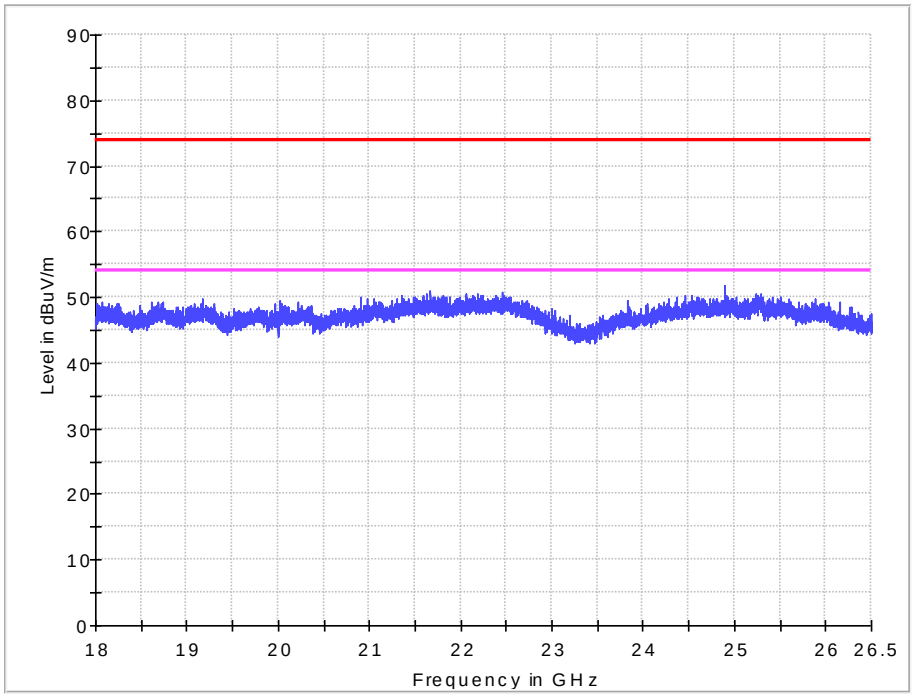

26.5 GHz - 40GHz

(Worst Case)
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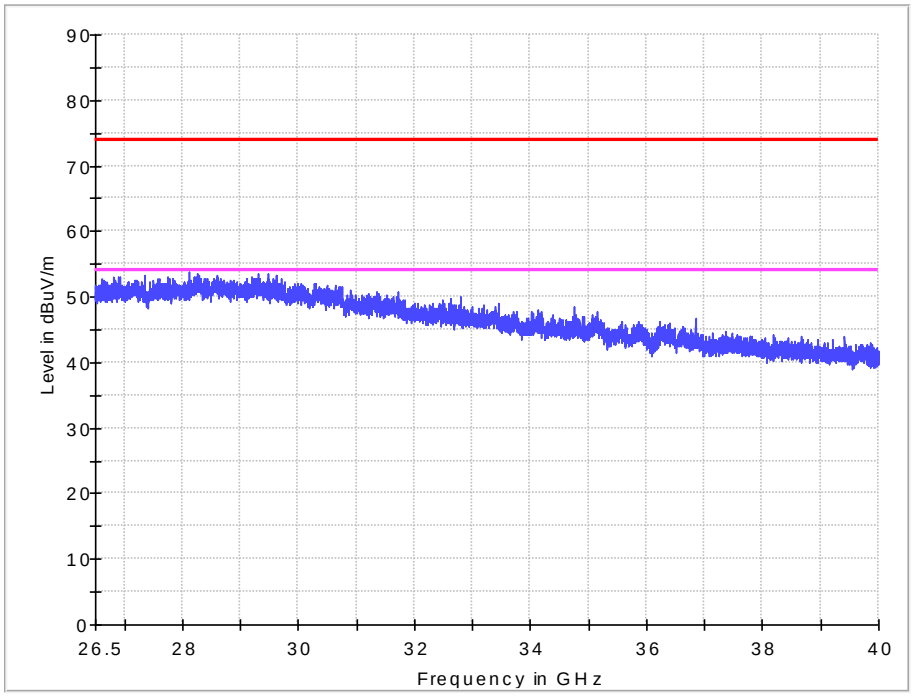

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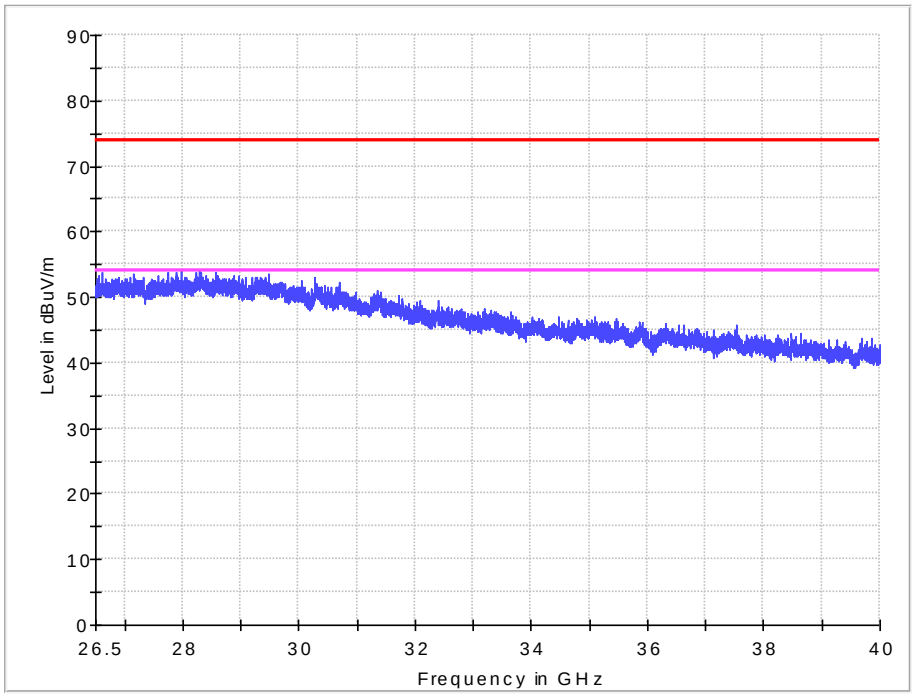
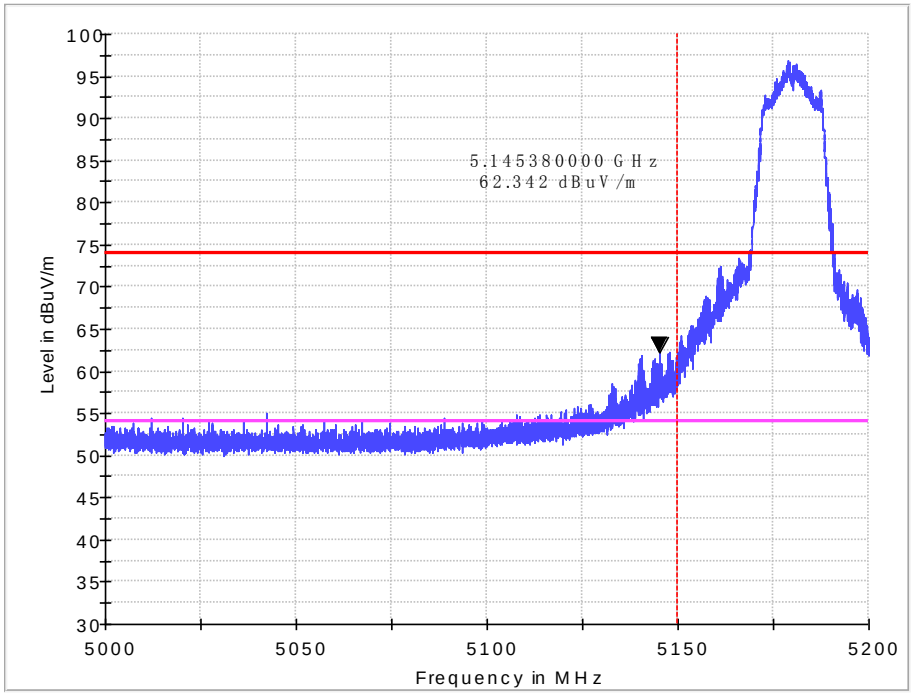


Band edge

11a IN THE 5.2GHz BAND
CH36

PK
Horizontal



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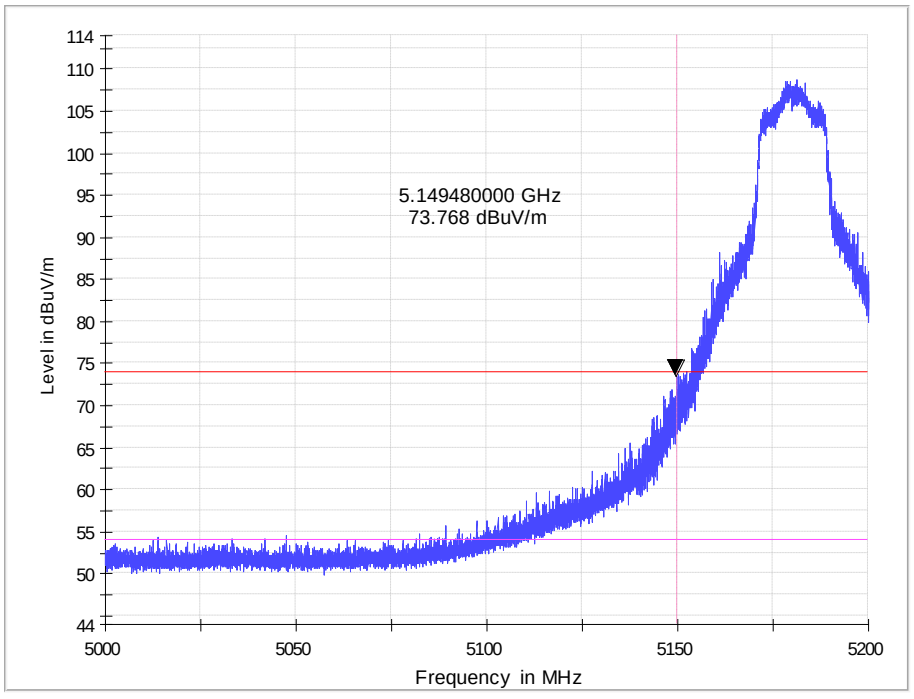

AV
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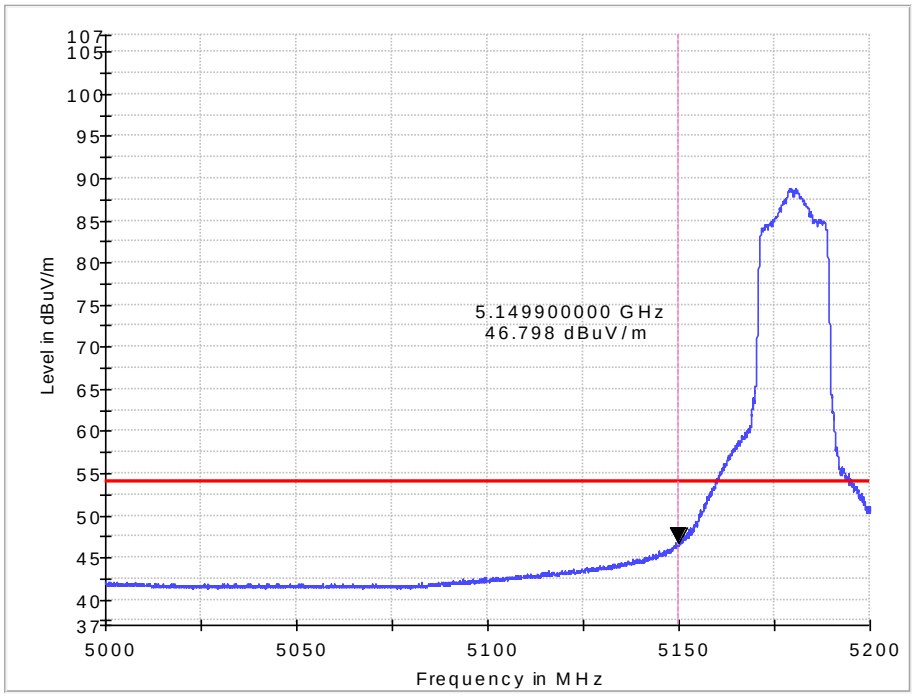

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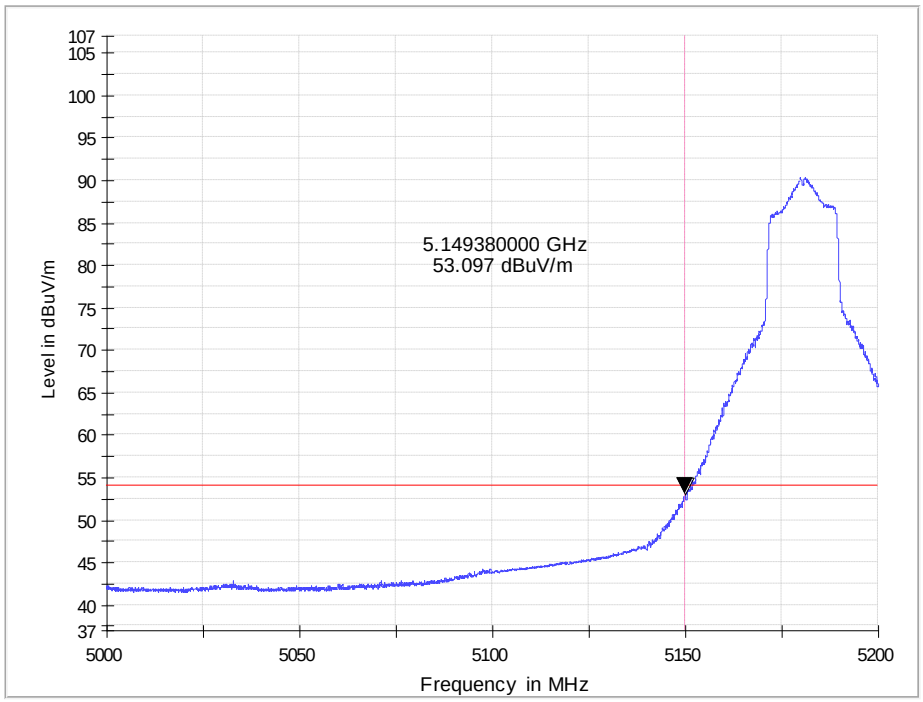

Band edge

11n HT20 IN THE 5.2GHz BAND
CH36

PK
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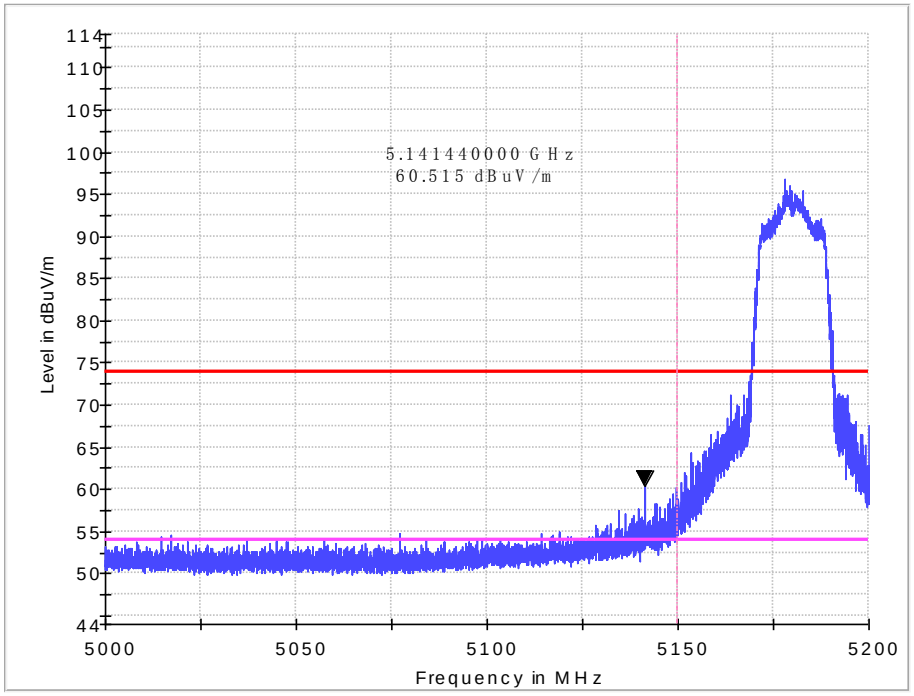

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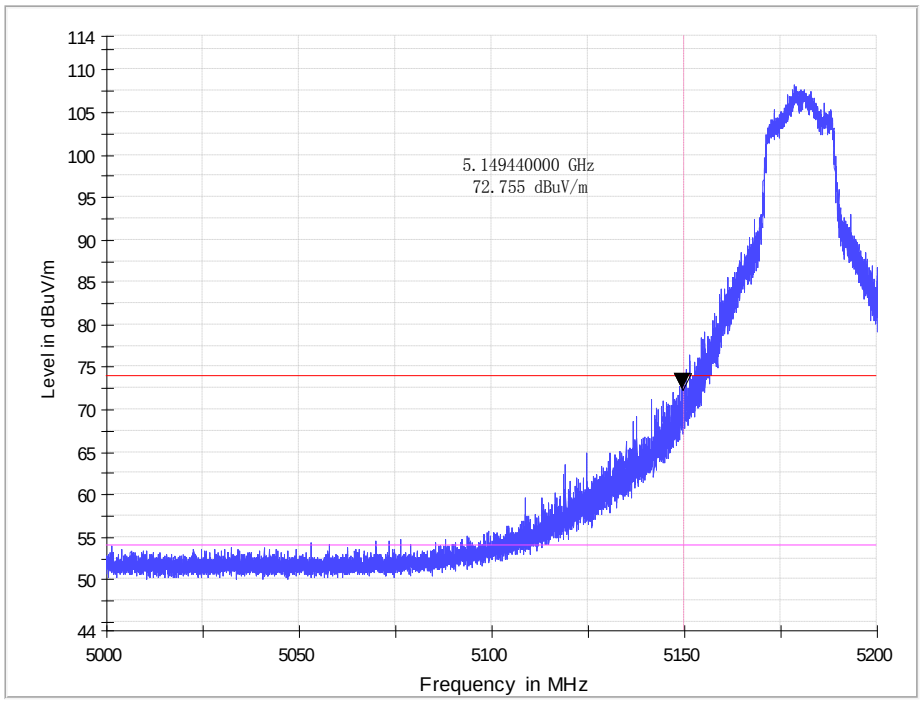
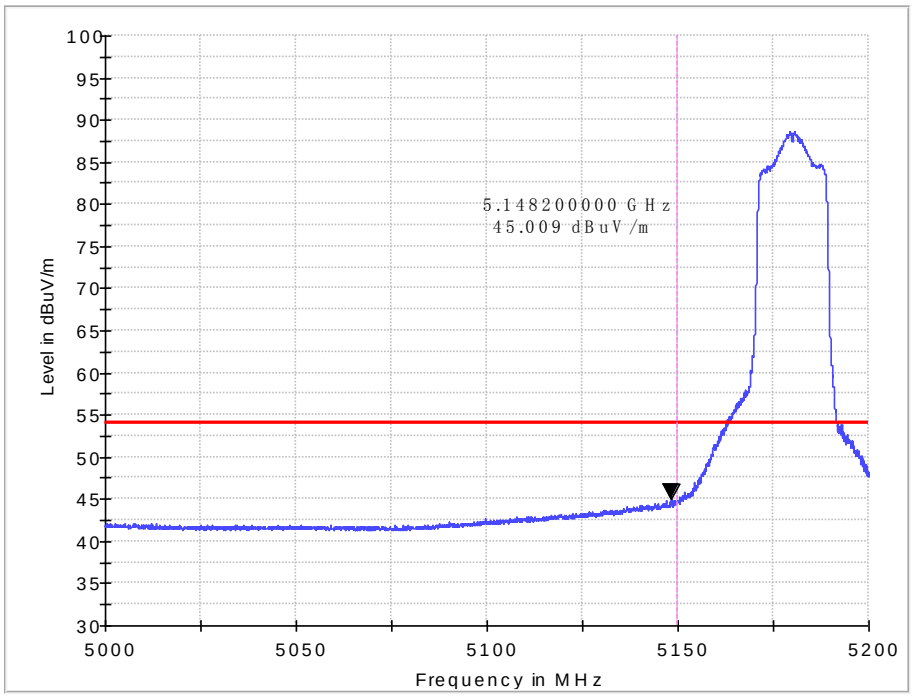


AV
Horizontal



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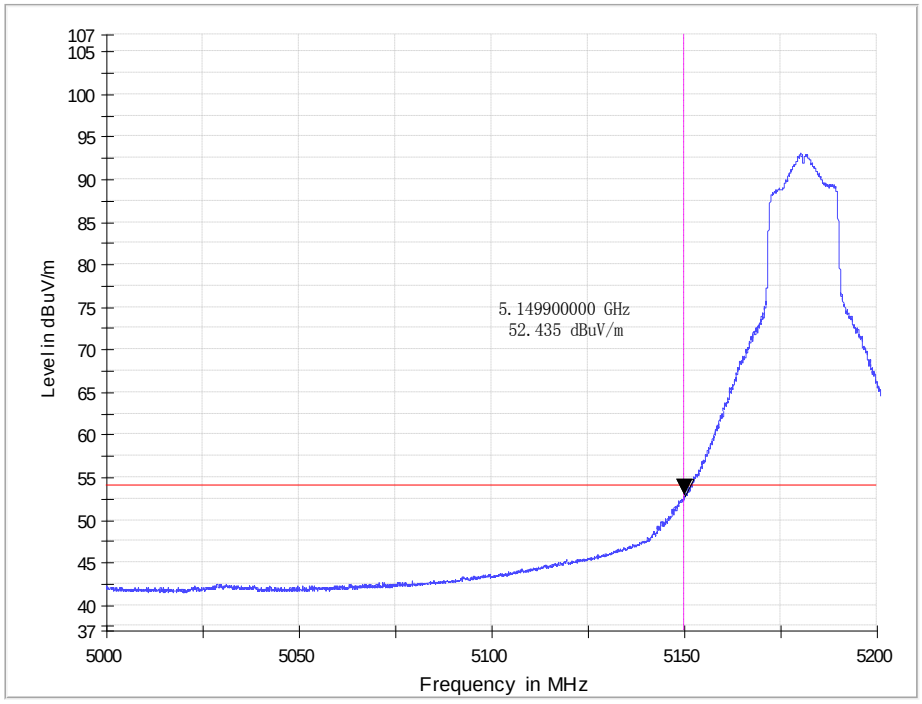
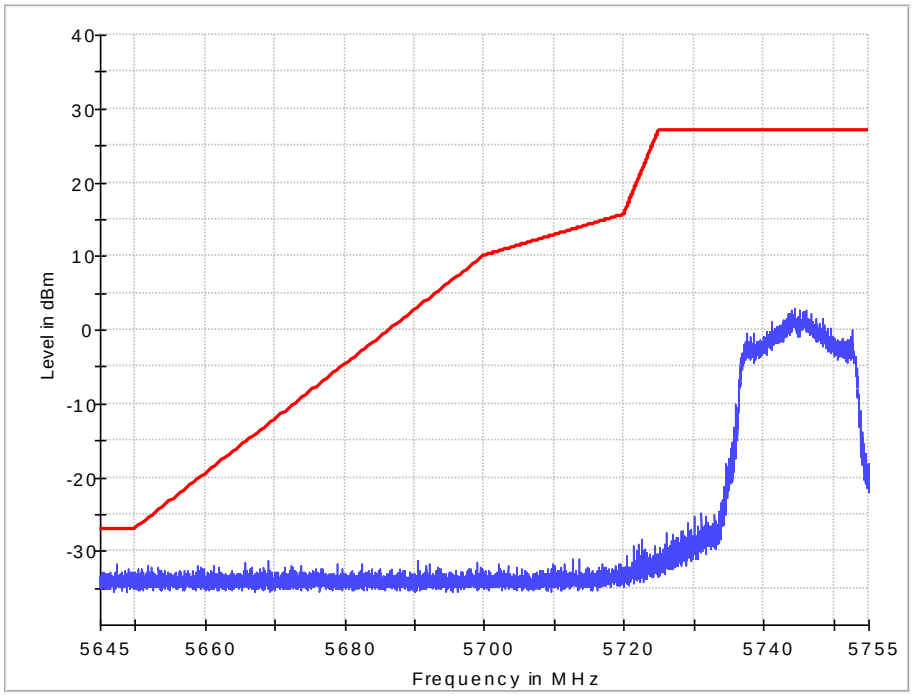


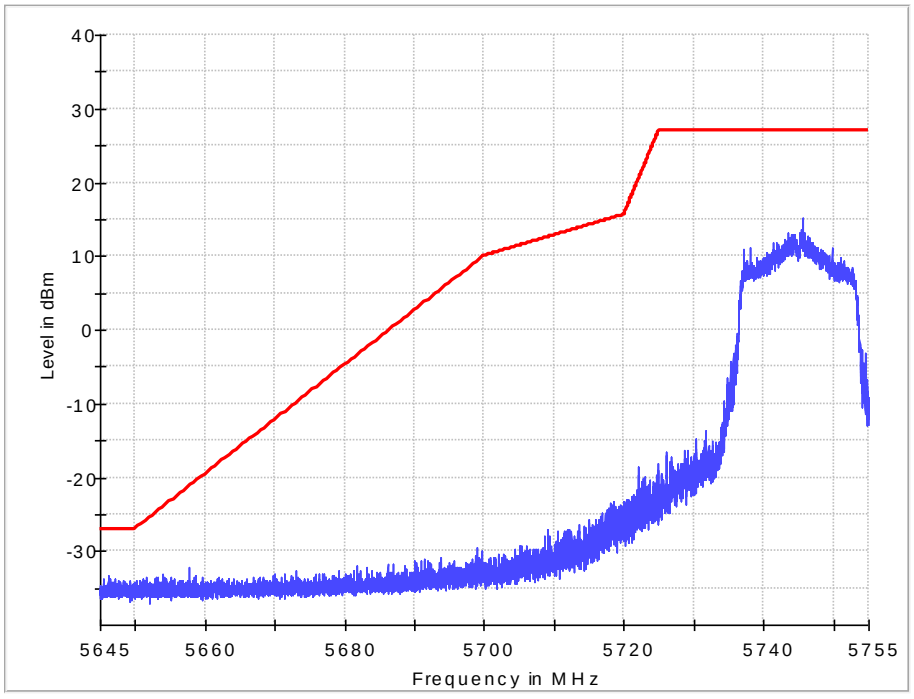
Band edge

11a IN THE 5.8GHz BAND
CH149

Horizontal



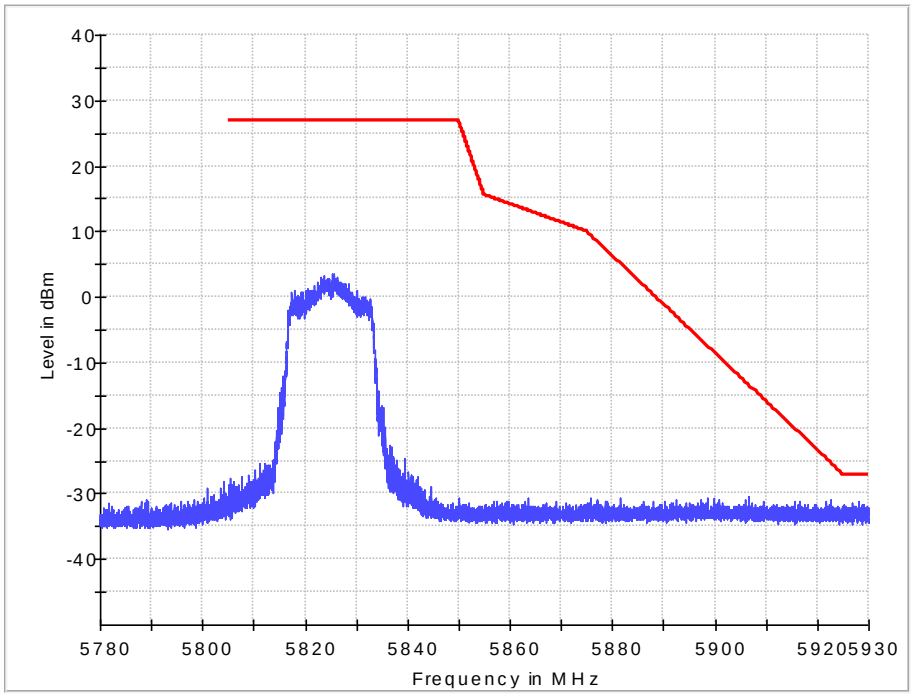
Vertical



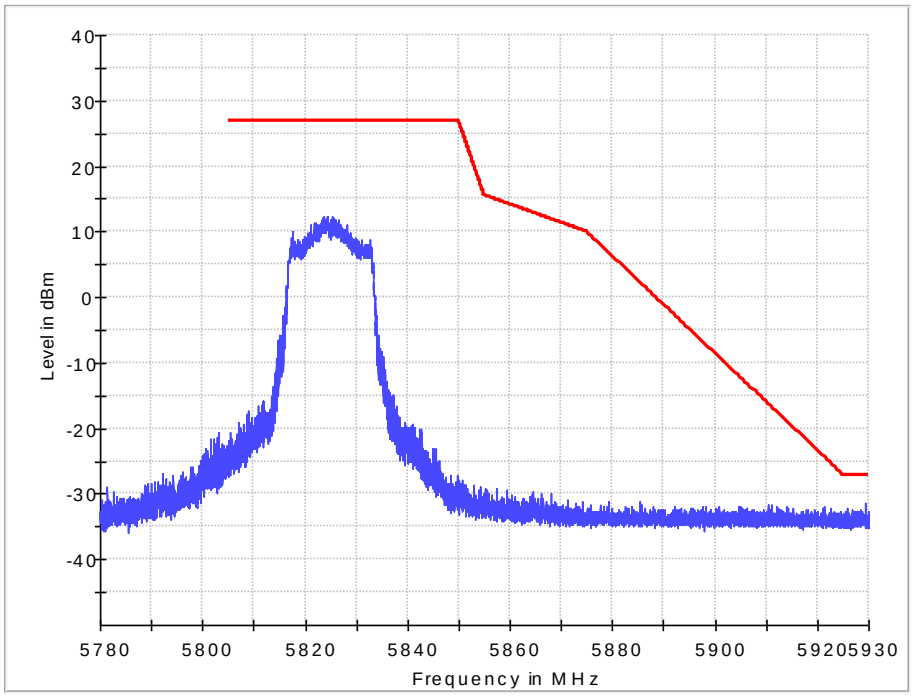
Band edge

11a IN THE 5.8GHz BAND
CH165

Horizontal



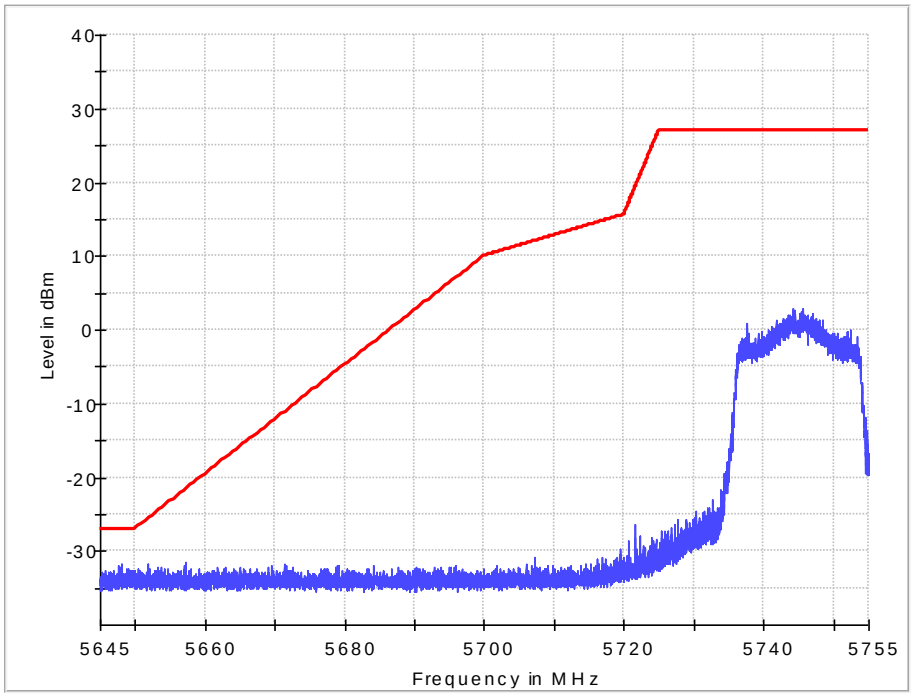
Vertical



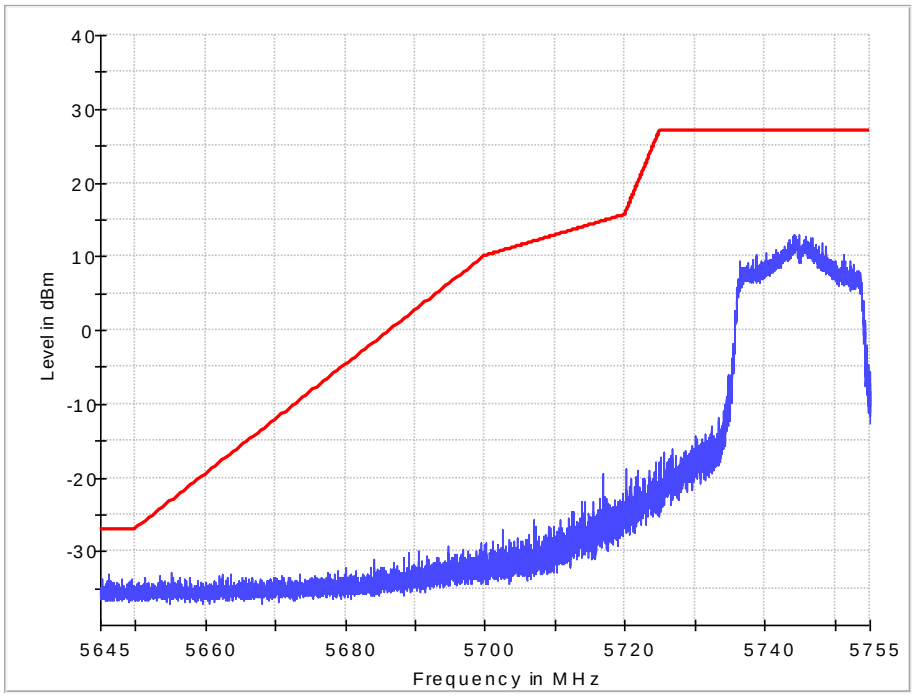
Band edge

11n HT20 IN THE 5.8GHz BAND
CH149

Horizontal



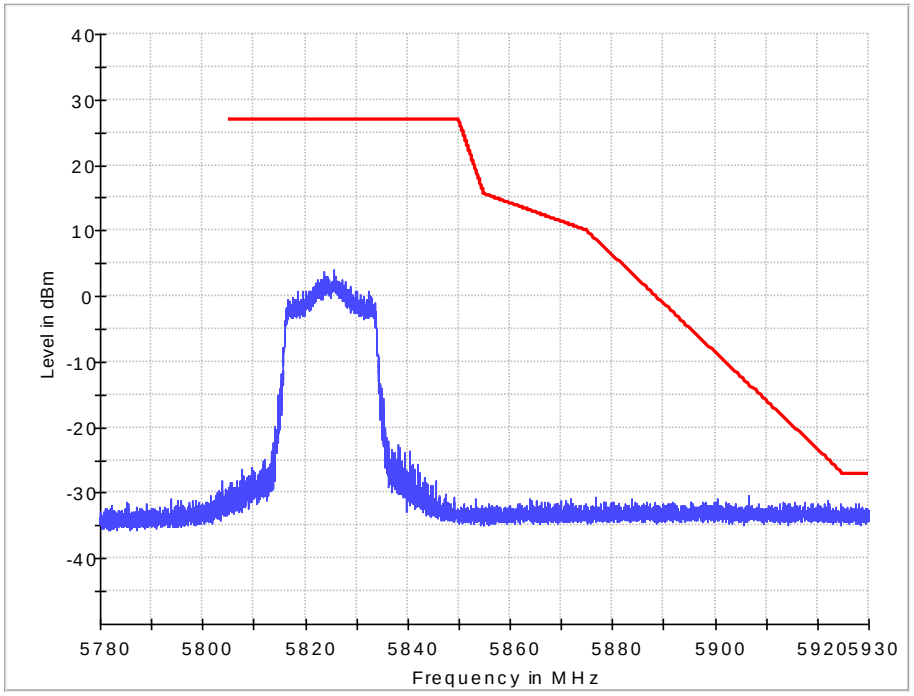
Vertical



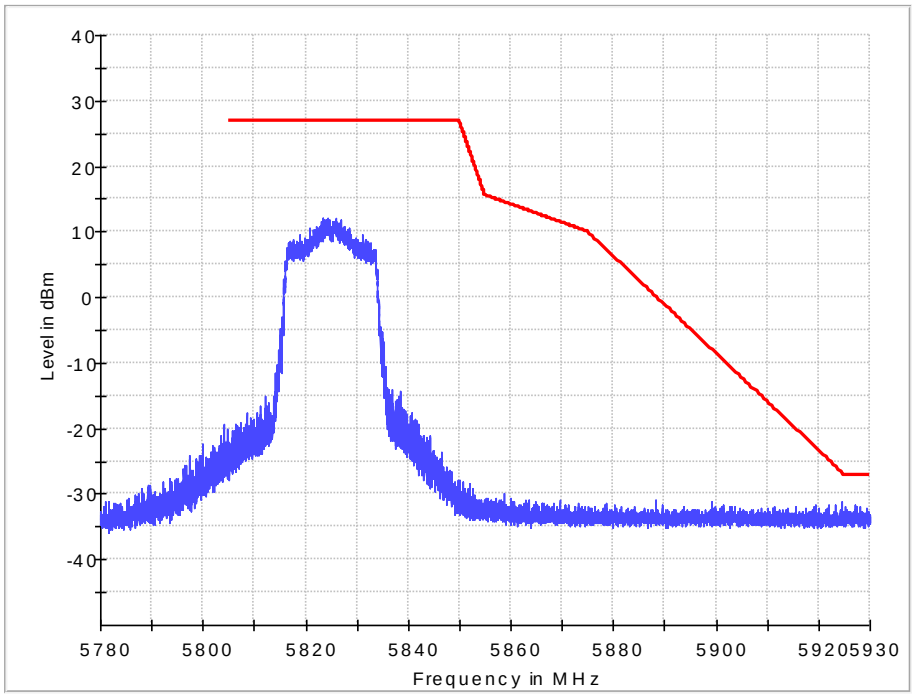
Band edge

11n HT20 IN THE 5.8GHz BAND
CH165

Horizontal



Vertical



11. CONDUCTED EMISSION TEST FOR AC POWER PORT MEASUREMENT

11.1. Test Standard and Limit

Test Standard
FCC Part 15 15.207
Test Limit

Table 13 Conducted Disturbance Test Limit

Frequency	Maximum RF Line Voltage (dBμV)	
	Quasi-peak Level	Average Level
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
500kHz~5MHz	56	46
5MHz~30MHz	60	50

* Decreasing linearly with logarithm of the frequency
* The lower limit shall apply at the transition frequency.

11.2. Test Procedure

The EUT is put on a table of non-conducting material that is 80cm high. The vertical conducting wall of shielding is located 40cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI test receiver (R&S Test Receiver ESCS30) is used to test the emissions from both sides of AC line. According to the requirements of ANSI C63.10-2020.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode.
The bandwidth of EMI test receiver is set at 9 kHz.

11.3. Test Arrangement

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test picture.

11.4. Test Data

The emissions don’t show in below are too low against the limits. Refer to the test curves.

Table 14 Conducted Disturbance Test Data

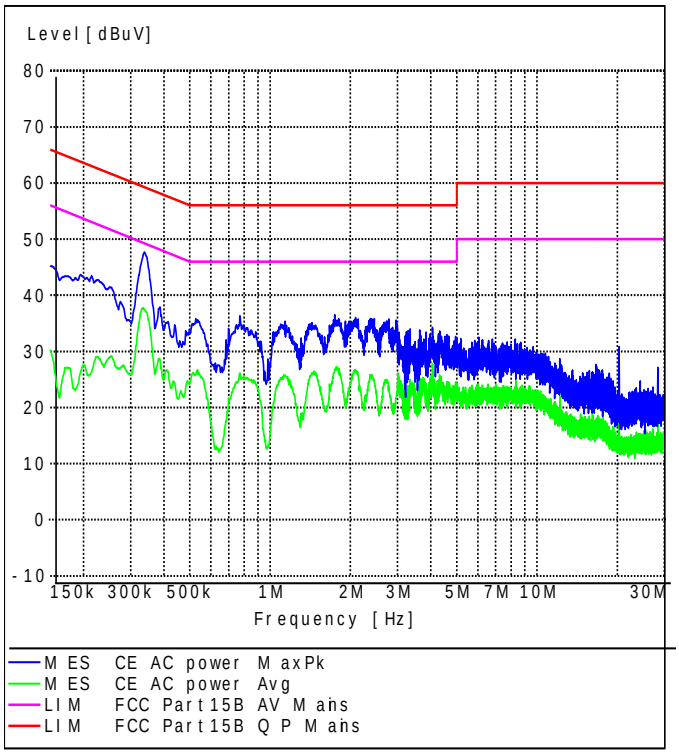
Test mode: Charging and Transmitting								
	Frequency (MHz)	Correction Factor (dB)	Quasi-Peak			Average		
			Reading (dBμV)	Emission Level (dBμV)	Limit (dBμV)	Reading (dBμV)	Emission Level (dBμV)	Limit (dBμV)
Line	0.150	9.7	31.8	41.5	66	20.4	30.1	56
	0.214	9.7	28.0	37.7	63.0	16.6	26.3	53.0
	0.338	9.7	33.4	43.1	59.3	28.0	37.7	49.3
	0.530	9.8	21.7	31.5	56	16.8	26.6	46
	0.770	9.8	21.7	31.5	56	16.4	26.2	46
	1.762	9.8	22.1	31.9	56	17.6	27.4	46
Neutral	0.150	9.7	33.1	42.8	66	19.4	29.1	56
	0.342	9.7	30.9	40.6	59.2	26.1	35.8	49.2
	0.510	9.8	21.3	31.1	56	15.5	25.3	46
	0.766	9.8	21.0	30.8	56	15.6	25.4	46
	1.082	9.8	19.9	29.7	56	14.5	24.3	46
	1.914	9.8	15.8	25.6	56	10.3	20.1	46

REMARKS: 1. Emission level(dBuV)=Read Value(dBuV) + Correction Factor(dB)

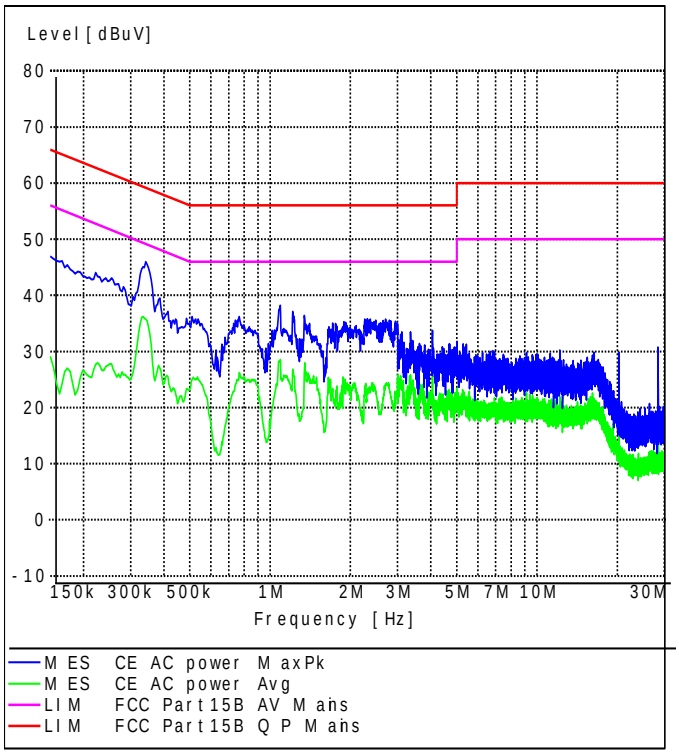
2. Correction Factor(dB) =LISN Factor (dB) + Cable Factor (dB)+Limiter Factor(dB)

3. The other emission levels were very low against the limit.

Line



Neutral



12. ANTENNA REQUIREMENTS

15.203 requirements:
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.
15.247(b) (4) requirements:
The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

12.1. Antenna Connector

Antenna Connector is on the PCB within enclosure and not accessible to user.

12.2. Antenna Gain

The antenna gain of EUT is less than 6 dBi.

End of Report